

4614

Beaver

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ECONOMIC STUDY OF BEAVER IN NORTH DAKOTA

STATE GAME AND FISH DEPARTMENT

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OBJECTIVES OF STUDY

Briefly this could be stated as "a study of economic damage problems in relation to beaver and the submission of proposed management practice designed to solve or alleviate these problems." Some of the main questions in this study have been as follows:

First of all, in which parts of the state and in which watersheds are beaver found and where do concentrations occur? In what part of the state do most damage reports originate and is there any correlation between beaver numbers on a watershed and the damage complaints? What are the types of damage that occur and with what frequency? Under the permit system does the landowner or trapper other than owner do most of the trapping? For what reason is most of the trapping done? What is the percentage of success under this system?

What have been the laws in this state in the past concerning beaver? Do other states have similar problems and, if so, what have they done to alleviate such situations? What type of harvest do the various states have and how are these operated? What has been the effect of open seasons in other states? What might the effect be in North Dakota? When are most of the pelts harvested in this state? What has been the history of live trapping and stocking in North Dakota? Where has most of this been done and why? What would the examination of past and present trapping and harvest records on a given area show?

HISTORY

Since Saugstad (5) has already summarized the history of beaver in North Dakota up to 1943, there is little need of reiterating this earlier history and I shall quote from him:

"The history of the beaver in North Dakota is quite similar to that of some of the other game animals. It is a story of original abundance, unrestricted harvest for a period of years, then near extinction. Protective legislation, although begun at a comparatively early date, evidently did not bring back the beaver as rapidly as might be anticipated.

"One of the best sources of information on the history of beaver in North Dakota is to be found in Vernon Bailey's (1) NORTH AMERICAN FAUNA series No. 49. In brief Bailey indicated that in the period around 1800 and for the next few years after that, Alexander Henry did a very flourishing business in beaver pelts in what is now the Pembina Hills region in North Dakota and that by 1806 Henry considered the beaver as becoming scarce for profitable trapping in that area. He notes that they were particularly abundant on the Sheyenne River. Maximillian, Prince of Weid, states that 25,000 beaver pelts were purchased at Fort Union in 1833. A good share of these pelts, however, may have come in from the territory to the west of what is now North Dakota. Some time later when Audubon visited that area, he reported the beaver as becoming rather scarce.

"Seton (5) believes that Alexander Henry's alleged lack of beaver in the Pembina area in 1806 must have been due to disease.

BEAVER

It is not possible to state the number of beaver in the State of Alaska in 1900, as no reliable statistics have been kept. The following table shows the number of beaver in the State of Alaska in 1900, as estimated by the United States Fish Commission.

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HISTORY

The history of the beaver in the State of Alaska is not well known. It is believed that the beaver was introduced into the State of Alaska by the Russians in 1800.

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"Mention is made of notes left by Tanner to the effect that about 1800 the beaver were being destroyed by some kind of a distemper. Great numbers were found dead or dying. From that time on beaver were not so plentiful in that area.

"From this rather early history Bailey skips to the comparatively recent period, i.e. from 1890 on to about 1920.

"Since Bailey was in North Dakota several times gathering material for his bulletin it is at times difficult to ascertain at just what date or period his notes refer to. Reference is made to quite a large number of beaver dams and colonies in North Dakota which he and others located during this period, yet one would infer after reading his account that they were quite uncommon and on p. 111 he states that:

"In 1919, after two years of open season on beavers, many of the colonies had disappeared or had been sadly reduced in numbers. A few traces of their work were found along the Missouri River at Sanish and Bismarck, and there were said to be a few beavers still in Apple Creek and Burnt Creek. Near the mouth of the Cannonball River they were very scarce, although they had been fairly common up to 1916."

"By 1900, according to Bailey, with the exception of a few colonies in inaccessible places there were practically no beaver in North Dakota. Seton likewise states 1900 probably marked the all-time low for beaver in North America. It was reported in 1912 that only one colony existed in the Turtle Mountains. One-time residents report that in the Pembina Hills beaver were virtually unknown during this period. In the 1920's an active colony attracted visitors from a radius of a hundred miles or more. The writer can recall seeing beaver when a small boy on his father's farm which is located about 5 miles southeast of Minot, and it is his belief that beaver have been in that area more or less continuously for at least the past 25 years."

By 1931 beaver had become common enough to allow their removal by a permit system. Since this time beaver have generally been on the increase. Even since Saugstad wrote his report in 1943 there has been some change in the range of beaver - especially noticeable are increases on the Sheyenne River, the Turtle Mountains and some of the Red River tributaries. These points will be brought out later in sections on harvest and populations.

LEGAL PROTECTION

Laws for protection of beaver have been quite variable in the 65 years since the first closed season on beaver was enacted. This history is available in the session laws of the state. However, since Saugstad (5) has summarized these laws he is again quoted:

"History of Legal Protection Afforded Beaver in North Dakota"

"1887-1892 Closed season on beaver enacted by territorial legislative assembly.

1892-1897 Evidently no legal protection.

- " 1889 North Dakota admitted to statehood.
- 1897-1903 No open season.
- 1903-1905 No open season.
- 1905-1909 Evidently an open season from November 10 to December 10 each year during this period.
- 1909-1917 No open season on beaver.
- 1915 Beaver may be taken if damaging landowner's property, under the Game and Fish Department's supervision. Money from pelts to be credited to the Game and Fish Department funds.
- 1917-1921 Open season on beaver January 10 - March 10, evidently to become effective January 10, 1918.
- 1921 The season was evidently open from January 10 to March 10, 1921. The 1921 legislature closed the season on beaver until January 10, 1924.
- 1923 The legislature placed beaver on the protected list. There would be no open season until reopened by legislative action.
- 1931 to present Present or existing law allowing landowners to remove beaver from their premises under permit system was enacted and became effective February 11, 1931. This law has subsequently been slightly modified."

BEAVER HARVESTS

General

That the beaver take for some watersheds has greatly increased while the harvest has gone down in other drainages can readily be shown by a glance at Table 1 which shows the harvest by watershed from the 1939-1940 season through the 1951-1952 season. This data is presented graphically in Figures 1 and 2. Figure 1 shows that the total take on all rivers of the Big Missouri drainage (this includes the Little Missouri and James Rivers) dropped from a high of approximately 1,400 in 1939-1940 and 1940-1941 to an average of only half that during the next ten years.

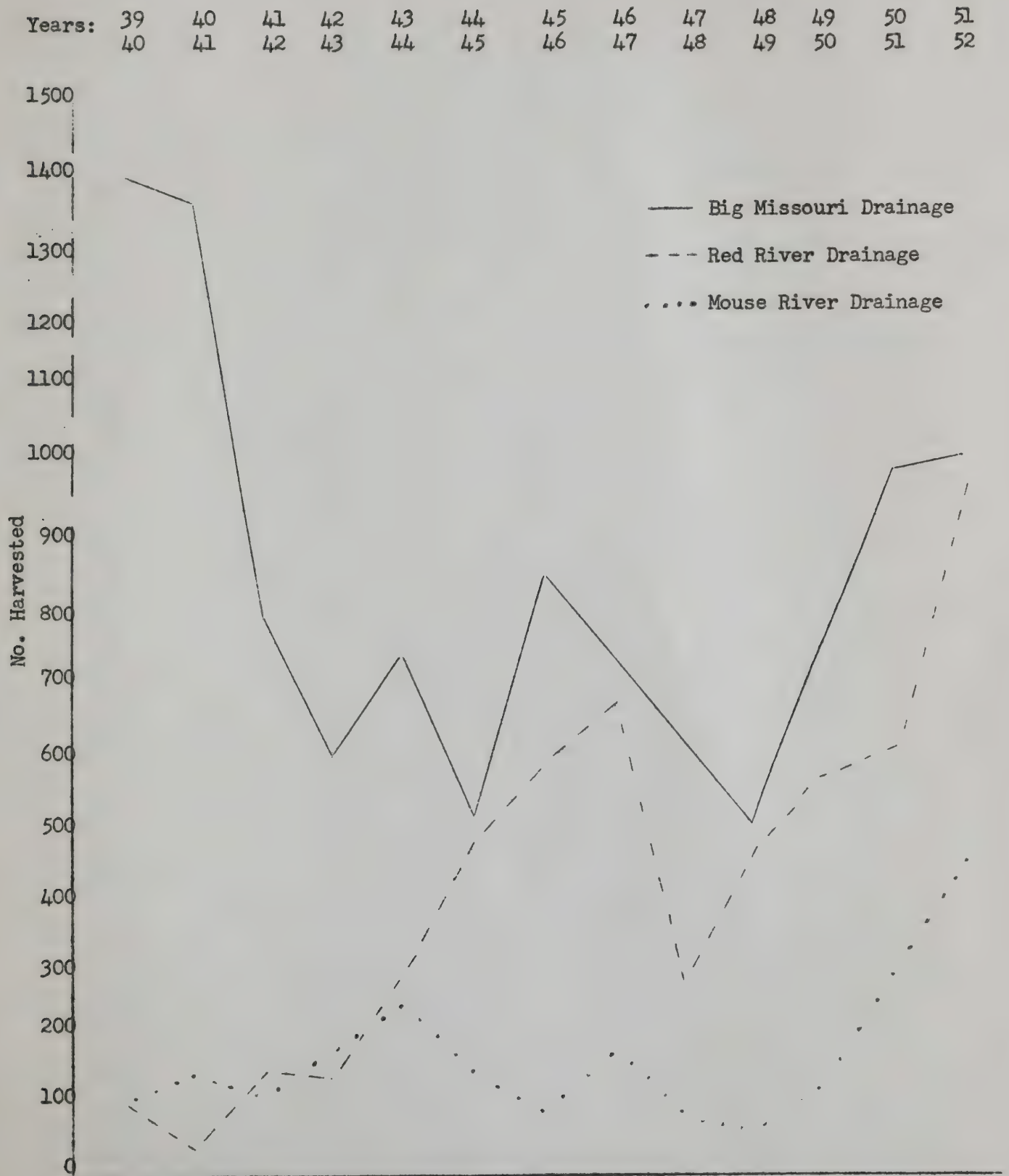
The Red River drainage, on the other hand, started with a total below 100 in 1939 and during six of the last seven years has had a take above 450. A large portion of this increased harvest can be attributed to the Sheyenne River (Figure 3) which had a harvest of only three beaver in 1939-1940 and a take of over 300 the last two years.

That the low beaver harvest on the Sheyenne River in earlier years was due to a low population, not to sufficient trapping, is brought out by Saugstad (5) who states that during the winter of 1941-1942 eleven colonies were found on the Sheyenne near New Rockford and that doubtless others occurred there. This

Table 1. Beaver Harvest on North Dakota Rivers 1939-1952
(Based on record of seals issued by Game & Fish Department)

| | 1939 | 1940 | 1941 | 1942 | 1943 | 1944 | 1945 | 1946 | 1947 | 1948 | 1949 | 1950 | 1951 | 1952 |
|-------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Taken | Taken | Taken | Taken | Taken | Taken | Taken | Taken | Taken | Taken | Taken | Taken | Taken | Taken | Taken |
| Heart River | 404 | 329 | 186 | 109 | 192 | 122 | 242 | 120 | 130 | 58 | 140 | 137 | 126 | |
| Knife River | 310 | 206 | 160 | 166 | 139 | 86 | 57 | 104 | 59 | 51 | 97 | 79 | 118 | |
| Cannonball River | 140 | 160 | 112 | 62 | 99 | 82 | 155 | 125 | 183 | 104 | 152 | 160 | 125 | |
| Little Missouri River | 306 | 270 | 184 | 111 | 99 | 86 | 115 | 119 | 81 | 68 | 110 | 230 | 137 | |
| Yellowstone River | 26 | 16 | 12 | 9 | 20 | 16 | 23 | 39 | 31 | 1 | 42 | 46 | 14 | |
| Grand River | 0 | 5 | 0 | 16 | 7 | 3 | 0 | 10 | 6 | 11 | 0 | 3 | 13 | |
| Missouri River | 209 | 372 | 125 | 108 | 146 | 85 | 238 | 190 | 113 | 153 | 205 | 313 | 354 | |
| Pembina River | 55 | 21 | 59 | 2 | 13 | 24 | 58 | 95 | 30 | 40 | 18 | 19 | 42 | |
| Tongue River | 30 | 2 | 44 | 24 | 57 | 63 | 28 | 56 | 16 | 15 | 8 | 26 | 31 | |
| Park River | 4 | 1 | 0 | 7 | 38 | 53 | 50 | 68 | 38 | 52 | 68 | 118 | 177 | |
| Forest River | 5 | 7 | 32 | 27 | 66 | 97 | 113 | 127 | 43 | 31 | 33 | 28 | 105 | |
| Turtle River | 0 | 0 | 0 | 0 | 0 | 8 | 12 | 4 | 6 | 5 | 33 | 18 | 78 | |
| Goose River | 0 | 0 | 0 | 8 | 0 | 0 | 14 | 17 | 1 | 12 | 26 | 49 | 63 | |
| Sheyenne River | 3 | 0 | 8 | 54 | 89 | 217 | 268 | 282 | 124 | 282 | 345 | 307 | 436 | |
| Red River | 0 | 0 | 0 | 12 | 19 | 14 | 34 | 18 | 8 | 24 | 31 | 37 | 33 | |
| James River | 17 | 20 | 9 | 5 | 27 | 18 | 18 | 29 | 0 | 43 | 27 | 33 | 24 | |
| Mouse River | 95 | 136 | 103 | 169 | 235 | 132 | 82 | 170 | 66 | 58 | 92 | 182 | 212 | |
| Turtle Mountains | 0 | 0 | 0 | 0 | 2 | 4 | 4 | 2 | 8 | 0 | 34 | 107 | 227 | |
| Mauvais Coulee | | | | | | | | | | 0 | 8 | 3 | 9 | |
| Miscellaneous | 0 | 0 | 0 | 5 | 10 | 0 | 0 | 12 | 2 | 4 | 0 | 15 | 10 | |
| Indians (Standing Rock) | 28 | 68 | 105 | 62 | 27 | 41 | 67 | 78 | 86 | 56 | 63 | 146 | 109 | |
| Indians (Fort Berthold) | 280 | 456 | 115 | 97 | 103 | 117 | 306 | 123 | 137 | 93 | 75 | | | |
| Game & Fish Dept. | 9 | 7 | 15 | 36 | 31 | 59 | 39 | 32 | 32 | 11 | 17 | 23 | 45 | |
| U. S. Wildlife Refuges | 0 | 0 | 122 | 34 | 146 | 258 | 124 | 65 | 0 | 0 | 32 | 23 | 48 | |
| Totals:1921 | 2076 | 1391 | 1123 | 1565 | 1585 | 2054 | 1885 | 1200 | 1172 | 1656 | 2102 | 2536 | | |

Figure 1. Harvest on the Three Major Drainages 1939-1952



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[illegible]

Journal of Management Education

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1990

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1997

| Trial | Control (n=10) | MCI (n=10) | AD (n=10) |
|-------|----------------|------------|-----------|
| 1 | 85 | 75 | 65 |
| 2 | 80 | 70 | 60 |
| 3 | 75 | 65 | 55 |
| 4 | 70 | 60 | 50 |
| 5 | 75 | 65 | 55 |

[illegible]

100

10

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12

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Figure 2. Beaver Harvest on Some Missouri Drainage Rivers

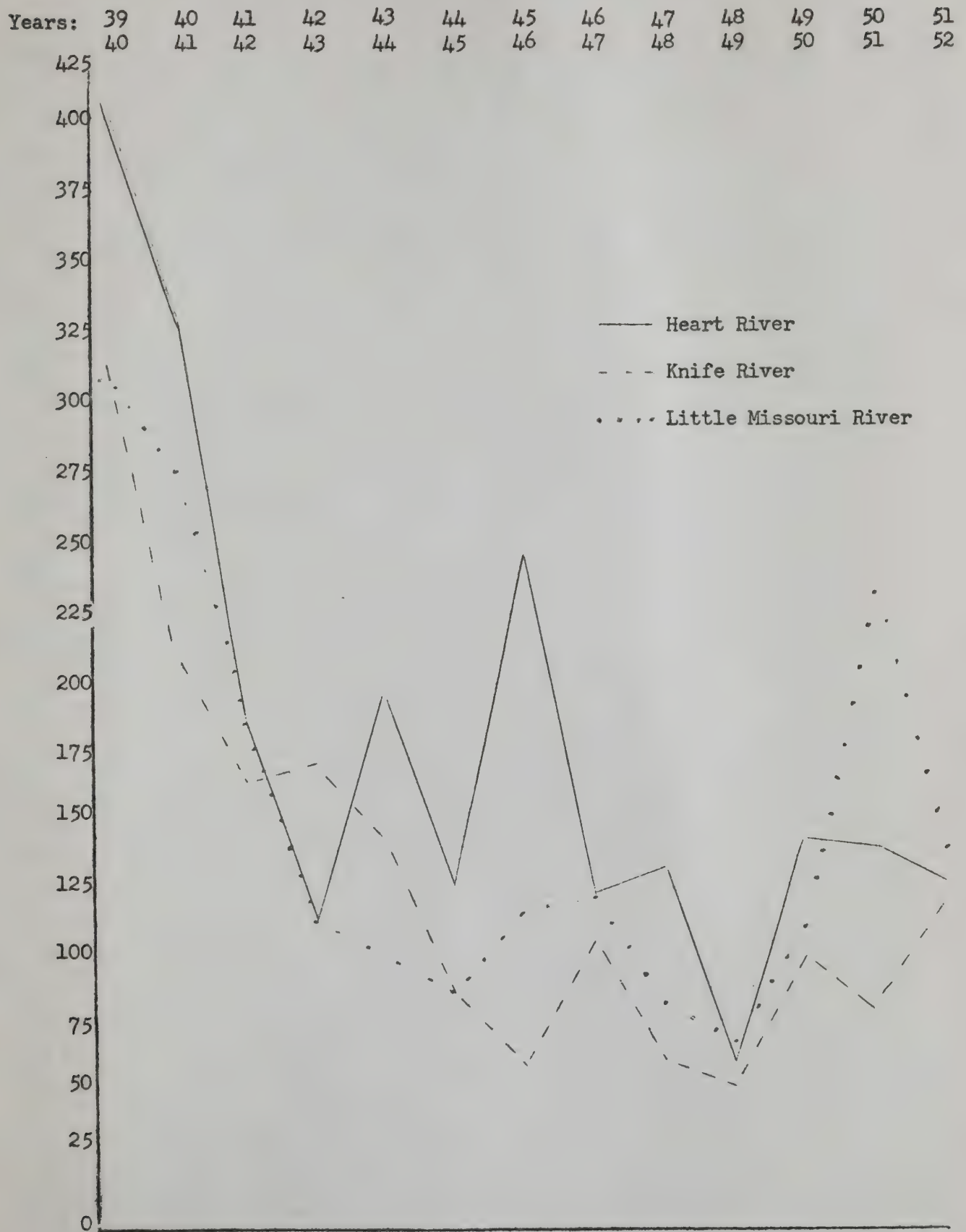
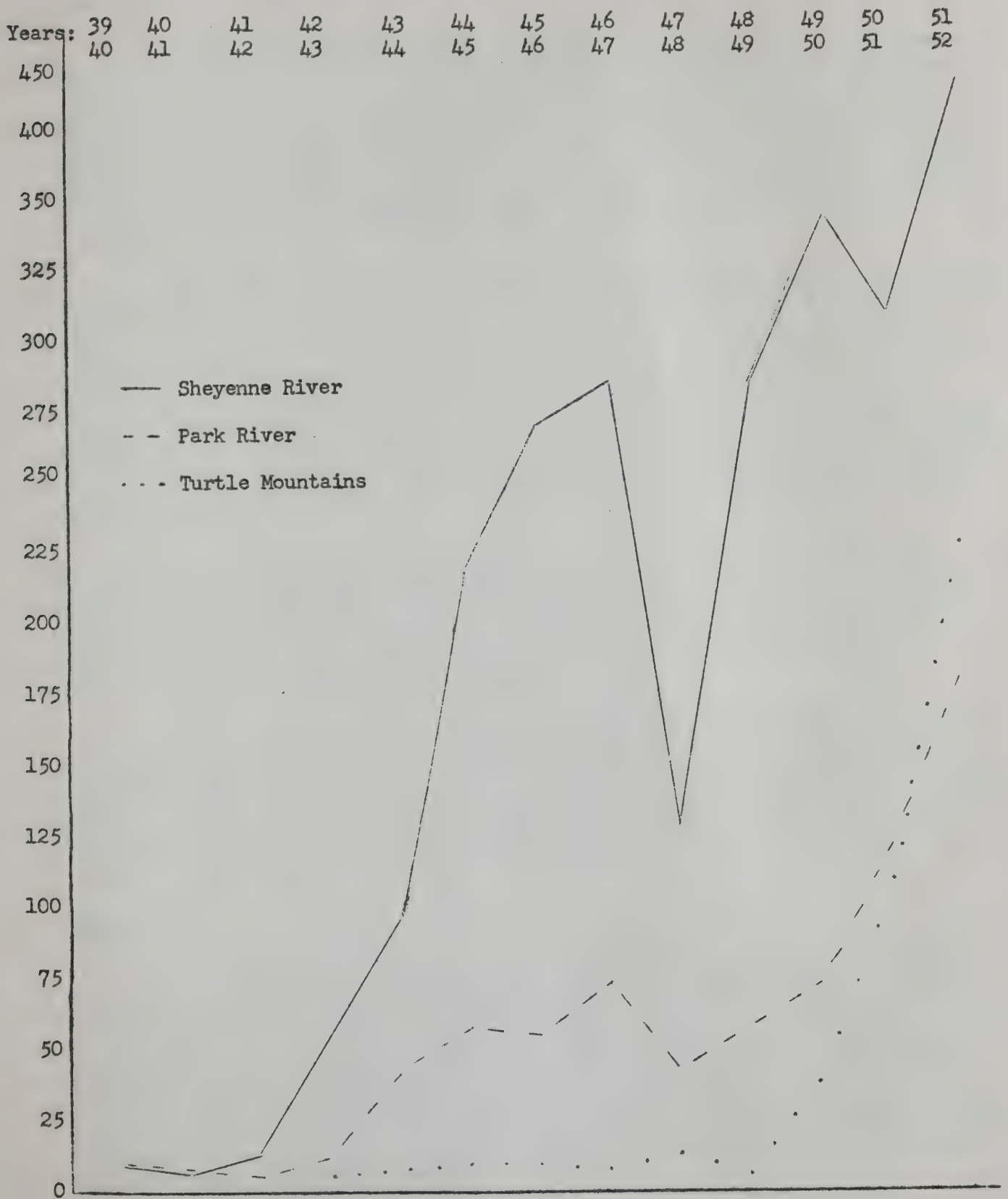


Figure 3. Beaver Harvest on two Red River Tributaries
and the Turtle Mountains 1939-1952



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(continued)

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was apparently considered unusual, as previous to plantings made in 1936 beaver were considered non-existent in this region. He gives an estimate of 75 colonies for the entire Sheyenne River. Today the Sheyenne is one of the heaviest trapped rivers of the state. One hundred and twenty seven permits were issued for this watershed in 1951-1952 and these very likely do not cover half the colonies on the river.

Some of the northeastern streams have also played a part in the increased harvest of the Red River drainage. An example of this is the Park River harvest (Figure 3). This river, like the Sheyenne, had a negligible harvest 10 years ago, whereas in recent years the take has reached the hundred mark. Other areas of the state have also had a considerable increase in the beaver population since Saugstad made his survey. He cites the Turtle Mountains as considerably understocked and gives a 1941-1942 estimate of 25 colonies. In 1951-1952 there were 43 permits on this area covering approximately 100 colonies, which again is certainly only a fraction of the existing colonies.

How have beaver harvests followed average prices paid for pelts? In Figures 2 and 3 there is a drop in take, either following the peak year for prices (1945-1946) or after the next year, 1946-1947. Apparently there is somewhat of a lag here between drop in price and drop in harvest. In Figure 4, which graphs the total take and number of permits against the average price, the peak year for prices and harvest coincide, although the following year is again quite high for the total harvest and is the peak year for the number of permits issued. Apparently the additional permits were taken out following a year of high prices in anticipation of another good year for beaver pelts. When this didn't happen the harvest dropped slightly even though there had been an additional 100 plus permits granted.

A further look at this graph shows a considerable drop in harvest during the second year of the war. This may be due to the war effort, as reflected by the fewer permits granted. That a substantial increase in the average price was enough incentive to increase the harvest, even during years of the war when many trappers were away, is shown by the rising curves of harvests and permits during the latter years of the war.

Following the low harvest years of 1947-1948 and 1948-1949 there is a sharp rise again in permits and take for the last three years on the graph. This is definitely not due to any rise in price of beaver, as the average price per pelt went down while the harvest went up. This anomaly may be due to the taking of beaver mainly because of their nuisance status instead of for their pelts. This is the only plausible reason which comes to mind when viewing this discrepancy between the two lines.

Apple Creek

In working with a single small stream one should be able to get at more of the cause and effect relationships of the difference between amount of harvest and price of pelts. Figure 5 graphs these relationship for Apple Creek, one of the smaller tributaries of the Big Missouri. In graphing larger streams and especially drainages you are dealing more with averages for the whole stream. Thus local population differences, variance in trapping pressure, etc. do not show up in the final figures and cannot be analyzed. On a smaller stream this averaging, which eliminates most high and low data from large watershed figures, does not occur. Thus there are probably more definite answers for the causes of peaks and lows on a small stream.

Figure 4. Comparison of Beaver Harvest with the number of Permits issued and the average Price.

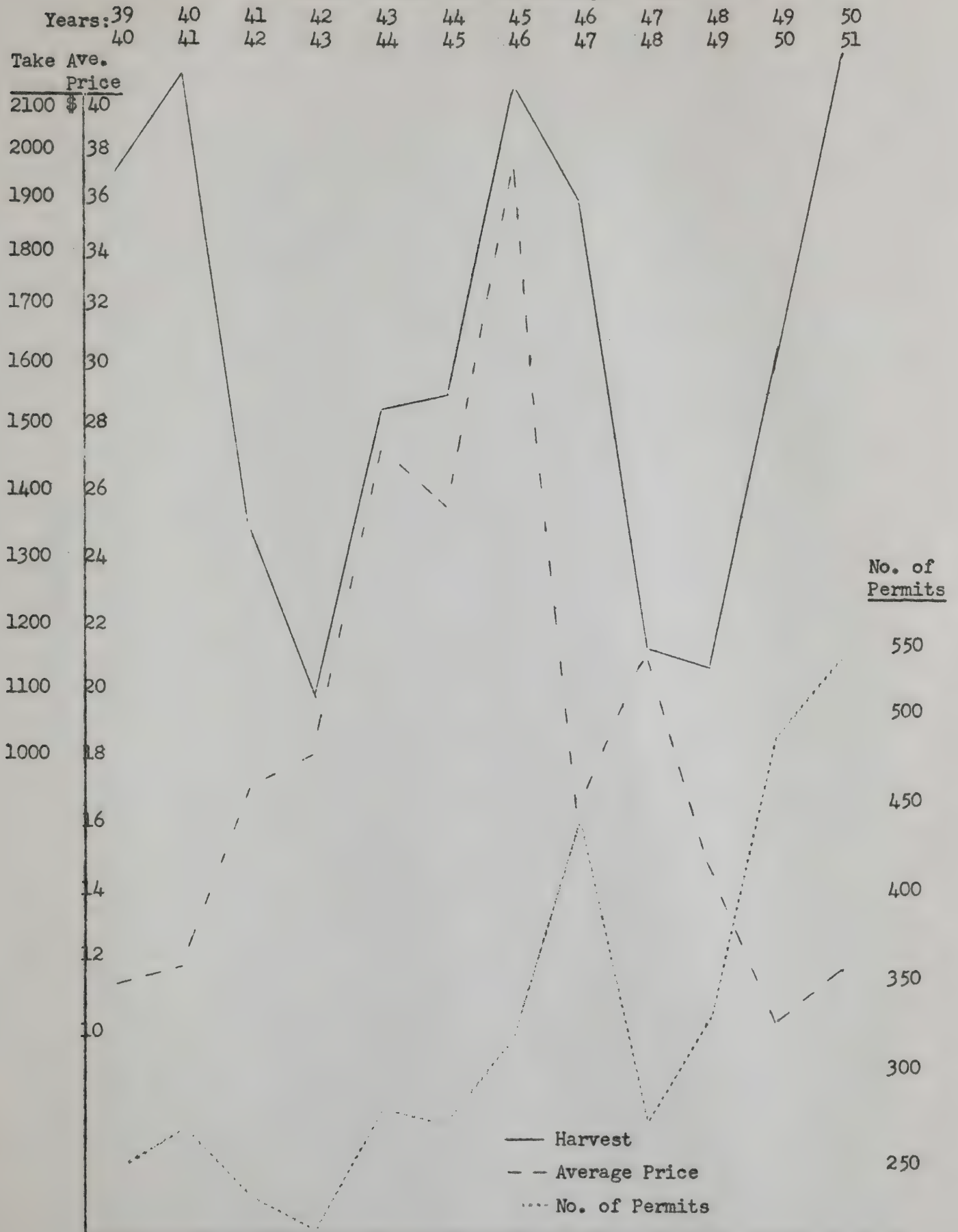
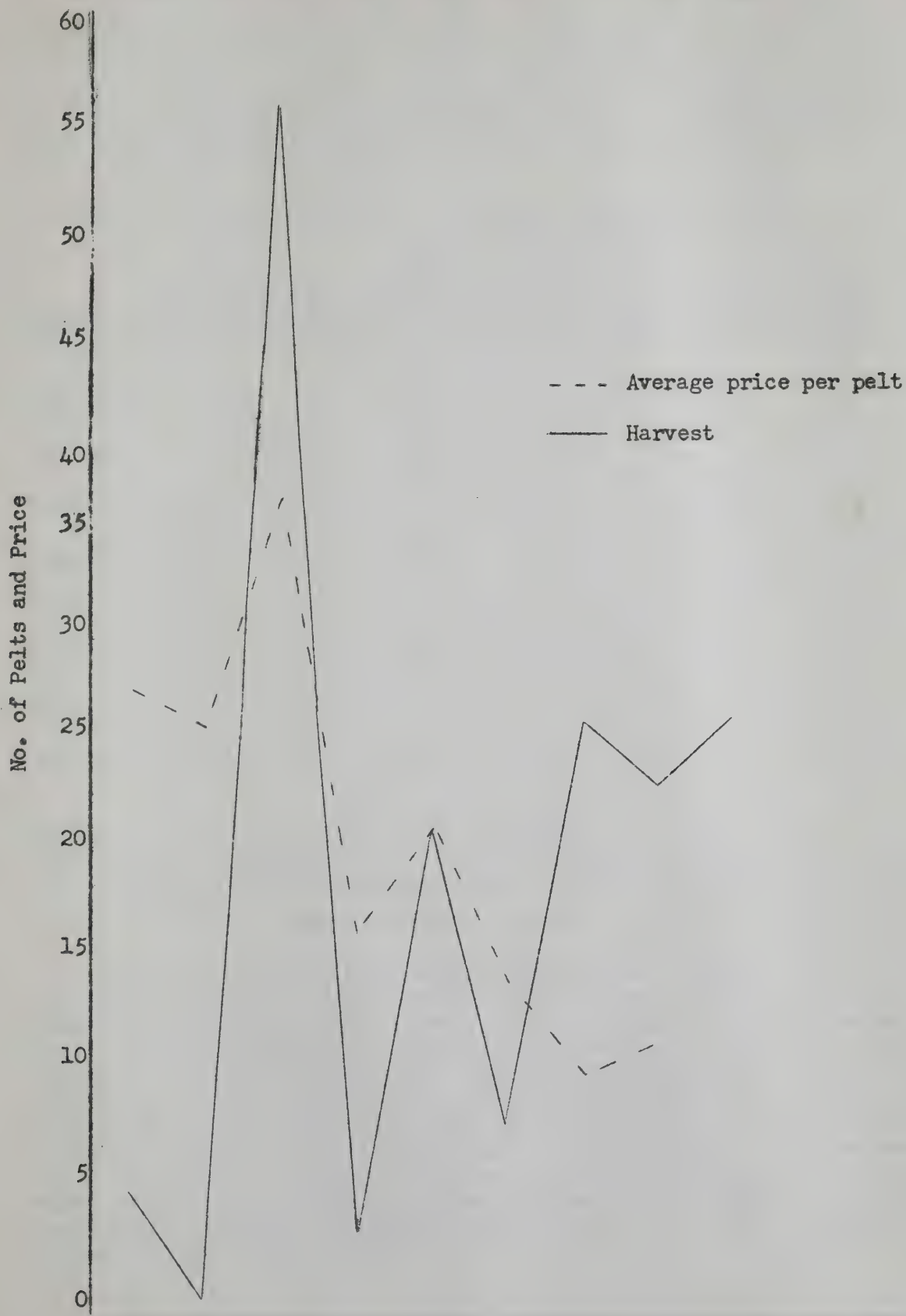


Figure 5. Average Price per Pelt as compared with Harvest on Apple Creek

| | | | | | | | | | |
|--------|----|----|----|----|----|----|----|----|----|
| Years: | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 |
| | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 |



1. The first two columns are the same as in the previous table.
 2. The third column is the same as in the previous table.

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|----|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

The first two columns are the same as in the previous table.

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90

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120

130

The first two columns are the same as in the previous table.

The most noticeable item in Figure 5 is the violent increase in harvest for the year 1945-1946 which coincides with an increase in price and the just as marked drop in harvest (following a drop in price in 1946-1947 to less than half the price of the previous year). A reference to Table 2 shows that this fluctuation in harvest can be somewhat explained by the increased number of permits for that year. But that it is largely explained by the high monetary return per pelt can be seen in the percent of allowed beaver taken for 1945-1946. That year of high prices saw practically 80% of the beaver taken that were allowed on Apple Creek permits. In no other year did the percent of allowed beaver that were taken rise above 40%.

| Year | No. of Permits | No. of Colonies | Total Beaver Allowed | Ave. No. Taken per Permit | Take on Permits | State Trapper | % of Allowed Taken | Ave. Price Pelt |
|---------|----------------|-----------------|----------------------|---------------------------|-----------------|---------------|--------------------|-----------------|
| 1943-44 | 3 | 6 | 24 | 2.0 | 6 | - | 25.0 | \$28.14 |
| 1944-45 | 3 | 8 | 22 | .33 | 1 | ?? | 4.5 | 26.52 |
| 1945-46 | 7 | 10 | 68 | 7.7 | 54 | 2 | 79.4 | 36.72 |
| 1946-47 | 2 | 3 | 11 | 2.0 | 4 | 3 | 36.3 | 17.38 |
| 1947-48 | 6 | 11 | 56 | 3.7 | 22 | 1 | 39.3 | 21.95 |
| 1948-49 | 4 | 5 | 34 | 2.3 | 9 | 3 | 26.5 | 15.39 |
| 1949-50 | 9 | 14 | 88 | 3.0 | 27 | - | 30.7 | 10.90 |
| 1950-51 | 4 | 10 | 63 | 6.0 | 24 | - | 38.1 | 12.40 |
| 1951-52 | 10 | 16 | 116 | 2.7 | 27 176 | - 9 | 23.3 | |

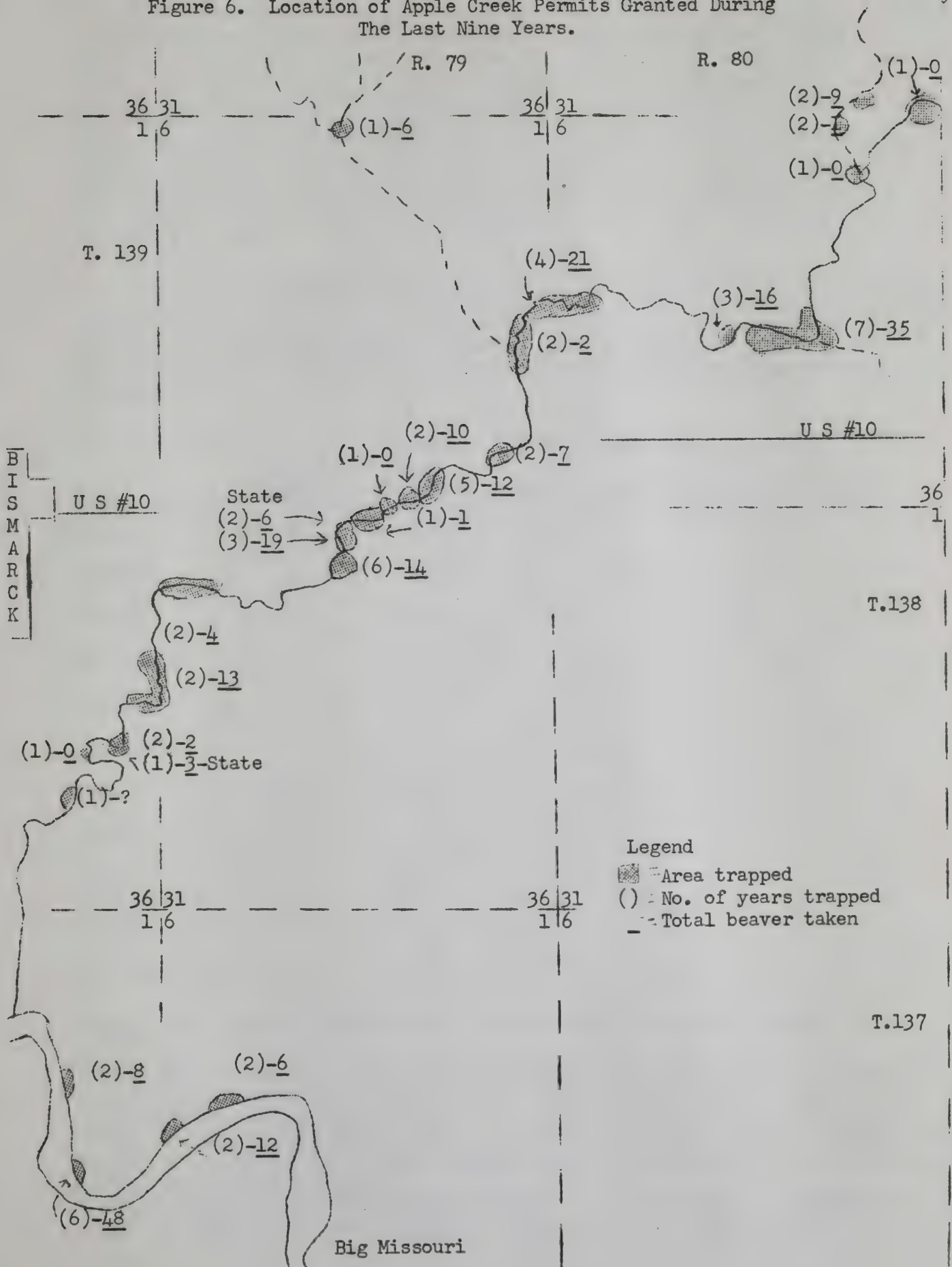
*10 taken in Burleigh County, some undoubtedly from Apple Creek.

Table 2. Date on Harvests, Permits, Etc. for Apple Creek.

Another way of comparing yearly harvest from a stream - more from the management standpoint than an economic evaluation - is based upon beaver take per mile of stream trapped. There are few instances in wildlife management where the total harvest for a given species on a given area can be calculated. Usually it can only be an estimate based on sampling techniques or various population indices. However, the permit system on beaver such as we now have in North Dakota provides one of the few exceptions to this rule. In this case a definite harvest figure can be calculated for any given drainage because all beaver taken must be sealed and we have legal descriptions of all areas where beaver were taken. Figure 6, portion of a map of Burleigh County, shows where these permits have been issued on Apple Creek for the past nine years and the harvest on each area.

• Don't compare your child to other children • Don't compare your child to other children • Don't compare your child to other children

Figure 6. Location of Apple Creek Permits Granted During The Last Nine Years.



With the above basic data, one can go back through the records and determine how many beaver have been taken on a given length of stream. Lengths of stream can be taken from county maps. However, checking of Apple Creek permits in the winter of 1951-1952 furnished proof that any figures on linear lengths of streams taken from county maps would be very conservative, as only larger curves of streams can be shown and the numerous smaller oxbows of small streams are left out. For instance the Burleigh County map indicated a stream length of approximately three miles over a given stretch of Apple Creek. It took four hours on skis to check this area following stream curves and only 40 minutes to return following a more direct route. A later check of mileage on tracings from aerial photos showed a stream mileage of seven miles for this particular stretch of stream.

Since the curved portions of streams are as useful to beaver as straighter portions, it was decided to use aerial photos as a basis of linear stream measurements. In the table below are figures on colonies and stream miles for the past nine years. In considering the number of miles of stream trapped each year, only the lengths of stream were measured which lay within the legal description of permits.

| Year | Colonies Trapped | Stream Miles Trapped ¹ | Beaver Take Per Mile Trapped | % of Total Mileage Trapped ² |
|----------------|------------------|-----------------------------------|------------------------------|---|
| 1943-44 | 6 | 6.2 | .97 | 9.2 |
| 1944-45 | 8 | 8.3 | ? | 12.3 |
| 1945-46 | 10 | 20.0 | 2.80 | 29.7 |
| 1946-47 | 3 | 4.6 | 1.52 | 6.8 |
| 1947-48 | 11 | 15.8 | 1.46 | 23.4 |
| 1948-49 | 5 | 7.5 | 1.60 | 11.1 |
| 1949-50 | 14 | 16.1 | 1.37 | 23.9 |
| 1950-51 | 10 | 9.3 | 2.58 | 13.8 |
| 1951-52 | 16 | 26.5 | 1.02 | 39.3 |
| All yrs. ave. | 9.2 | 12.7 | 1.60 | 18.8 |
| All yrs. total | - | 39.9 | 4.59 | 59.2 |

¹Data based on linear measurements of Apple Creek from aerial photos.

²Total mileage is here considered to be 67.4 miles and represents the length of Apple Creek from the lowest permit near the mouth (Sec. 26 - T. 138 - R. 80) to the farthestest up stream permit (Sec. 32 - T. 140 - R. 77) and includes 2.3 miles of branch creek adjacent to the latter description, one 1943 and one 1947 permit which are 12 and 5 miles respectively up tributaries are not included within total miles trapped.

Table 3. Nine Year Beaver Harvest on Apple Creek on a Take per Mile Basis.

From a comparison of Table 3 and Table 2 it can be seen that while the beaver take for various years fluctuated considerably the actual number of beaver taken per mile trapped varied only from a low of one to a high of 2.8. The latter high figure again being in the year of greatest economic incentive to catch beaver.

Table 3 also shows that of the 67.4 miles of stream considered nearly 60% has been trapped at one time or another during nine year period. That 40% of the stream remained untrapped in nine years of trapping is probably a reflection of two things:

1. Much of this remaining stream length is rather barren of trees and probably never harbored a colony of beaver.
2. Other areas are wooded and provide suitable habitat and undoubtedly have harbored beaver during this trapping period but have not been trapped, perhaps through indifference of the landowner. Several of these wooded areas lie adjacent to trapped areas and had relatively recent beaver signs in the winter of 1951-52.

The average take-per-mile-trapped figure of 1.6 may be indicative of what one may expect to take on trapped areas of comparable streams without depleting the populations. Perhaps a better figure would be obtained by considering the total length of habitable portions of the stream. In this case the average take per mile per year would be close to .3 beaver. This theorizing does not take into account that 65 beaver were released near Bismarck during this period and that some of these animals may have moved up Apple Creek and augmented local populations. That some of these animals did move up tributaries will be brought out in the section on returns of tagged beaver. However, none of the 16 tagged beaver released in the Big Missouri at Bismarck were reported in Apple Creek. Some of these released beaver may have been taken in heavy trapping near the mouth of Apple Creek. Seventy seven animals were taken during this period, all within 5-6 miles or less of the mouth of the creek. This is compared to 183 animals taken along the entire length of Apple Creek. Possible this heavy trapping near the mouth of the creek may have prevented some animals from moving up stream.

The best way to utilize figures of beaver take per mile of stream would be to compare this figure to pre-season census figures. The only year any given continuous stretch of Apple Creek has been given an adequate census was in the aerial census of 1948. That year in the 14 miles (as was estimated from county maps) from the mouth of the creek to the bridge on the north edge of Section 3 - Township 138 - Range 79 there were found 12 colonies. At an average of 5 beaver per colony this would mean 60 beaver for this area. Of this estimated population only five beaver were taken during the trapping season on the one area where a permit was obtained. This seems to indicate a rather low trapping pressure. This may only be a reflection of the poor harvest obtained for that year in Apple Creek and the state as a whole.

There is a considerable amount of material in the
files of the various departments of the Government
which is of interest to the public. It is
the policy of the Government to make this material
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Economic Values

What has been the revenue to the state and to trappers from past beaver harvests? Table 4 below is an attempt to answer this question.

| Year | State Revenue | | | | Trapper Earnings | |
|---------|---------------|------------|-------------|----------------|---------------------|--------------|
| | Permits | Tags | Pelts | Total for Year | Ave. Price Per Pelt | Total |
| 1939-40 | \$ 876 | \$ 478.00 | \$ 108.00 | \$ 1,462.00 | \$12.00 | \$ 22,944.00 |
| 1940-41 | 930 | 517.50 | 87.50 | 1,535.00 | 12.50 | 25,862.50 |
| 1941-42 | 834 | 344.00 | 269.55 | 1,447.55 | 17.97 | 24,726.72 |
| 1942-43 | 774 | 271.75 | 682.20 | 1,727.95 | 18.95 | 20,598.65 |
| 1943-44 | 963 | 383.50 | 759.78 | 2,106.28 | 28.14 | 43,166.76 |
| 1944-45 | 939 | 381.50 | 636.48 | 1,956.98 | 26.52 | 40,469.52 |
| 1945-46 | 1,059 | 503.75 | 881.28 | 2,444.03 | 36.72 | 73,990.80 |
| 1946-47 | 1,395 | 463.25 | 399.74 | 2,251.99 | 17.38 | 32,205.14 |
| 1947-48 | 933 | 292.00 | 109.75 | 1,334.75 | 21.95 | 25,637.60 |
| 1948-49 | 1,110 | 290.25 | 123.12 | 1,523.37 | 15.39 | 17,867.79 |
| 1949-50 | 1,539 | 409.75 | 119.90 | 2,068.65 | 10.90 | 17,865.10 |
| 1950-51 | 1,653 | 519.75 | 173.60 | 2,346.35 | 12.40 | 25,779.60 |
| Totals | \$13,005 | \$4,855.00 | \$4,350.90* | \$22,210.90 | | \$371,114.18 |

*Does not include earnings from pelts trapped by Momb (approximately \$2,500.00).

Table 4. Income to the State and Trappers from 12 Years of Beaver Harvest.

During this 12 year period, 4,335 permits and 19,419 beaver were taken (exclusive of those taken by Game and Fish employees). This represents an income of \$17,860.00 to the Department from license and tag sales. Referring to the above table it can be seen that trappers took in \$371,114.18 during this same period. Thus 4.8% of their trapping money went to pay for licenses and tags.

$\frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$

1990

[illegible]

TRAPPER SUCCESS

Table A (in Appendix) shows the number of beaver taken per permit for various years. Also the number allowed and the percent of those allowed that were taken. By checking back in Table 6, one can also get some of this data as far back as 1931. Previous to 1937-1938, however, the number of seals issued does not necessarily indicate the number of beaver taken, as the seals were sold directly to the trappers, i.e. pelts were not tagged by Game and Fish personnel. Thus not all the seals were necessarily used. However, since these seals had to be purchased it is presumed that most of them were utilized.

The desirability of beaver pelts during peak price years can again be traced out in the column of "percent of allowed taken". There is a general increase in percentage taken up to a high of 61% during the peak price year of 1945-1946. Following this, the percentage taken drops off rapidly, as does the price. Part of this drop in the percentage of beaver taken, however, can probably be attributed to the generous allowance of the last three or four years. For in many cases it was probably quite unlikely that even a good trapper could get the full share allotted him.

Another way of getting at trapper success is by calculating the percentage of permits issued that are successful. Table 5 gives the available success data for recent years.

| Success % on Permits | Successful | | Unsuccessful | | Successful Trappers Taking only 1 Animal | |
|-------------------------|------------|------|--------------|------|---|------|
| Years | No. | % | No. | % | No. | % |
| 1946-47 | 395 | 82.8 | 82 | 17.2 | 61 | 12.8 |
| 1947-48 | 234 | 76.0 | 74 | 24.0 | 27 | 8.8 |
| 1948-49 | 244 | 66.0 | 126 | 34.0 | 32 | 8.7 |
| 1949-50 | 331 | 63.8 | 188 | 36.2 | 61 | 11.8 |
| 1950-51 | 362 | 66.8 | 180 | 32.2 | 43 | 7.9 |
| 1951-52 | 423 | 58.5 | 300 | 41.5 | 38 | 5.3 |

Table 5. Six Year Trapper Success Data.

Although this data does not go back for very many years, it can still be seen that the degree of success has been variable. The poorest success was during the years of low prices.

From this data, it seems logical to assume that even if beaver permits were asked for and granted on all major trouble spots this would still not necessarily be any assurance of relief of beaver troubles because of the relatively low success ratio of some years - especially during poor price years.

CHAPTER 10

The first part of the chapter is devoted to a discussion of the various methods of determining the rate of reaction. The second part is devoted to a discussion of the various factors which influence the rate of reaction. The third part is devoted to a discussion of the various factors which influence the equilibrium constant.

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| TABLE 10.1 | | | | | |
|---|--------------|------------|--------------|------------|--------------|
| Rate of reaction (M/min) vs. Time (min) | | | | | |
| Time (min) | Rate (M/min) | Time (min) | Rate (M/min) | Time (min) | Rate (M/min) |
| 0.0 | 0.00 | 1.0 | 0.10 | 2.0 | 0.20 |
| 0.5 | 0.05 | 1.5 | 0.15 | 2.5 | 0.25 |
| 1.0 | 0.10 | 2.0 | 0.20 | 3.0 | 0.30 |
| 1.5 | 0.15 | 2.5 | 0.25 | 3.5 | 0.35 |
| 2.0 | 0.20 | 3.0 | 0.30 | 4.0 | 0.40 |
| 2.5 | 0.25 | 3.5 | 0.35 | 4.5 | 0.45 |

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| <u>Year</u> | <u>No. Beaver Permits Issued</u> | <u>No. Seals Issued Per Permit</u> | <u>No. Seals Issued</u> |
|--------------------------------|--------------------------------------|--|-------------------------|
| Feb. 11 up to Nov. 30, 1931 | 596 | 6.4 | 3,781 |
| 1931-32 | 329 | 6.9 | 2,283 |
| 1932-33 | 88 | 5.2 | 455 |
| 1933-34 | 193 | 7.6 | 1,471 |
| 1934-35 | 124 | 9.9 | 1,228 |
| 1935-36 | 10 | 2.6 | 26 |
| 1936-37 | 96 | 9.5 | 916 |
| Sub-total | <u>1,436</u> | <u>7.08</u> | <u>10,160</u> |
| 1937-38 | 70 | 6.0 | 556 |
| 1938-39 | 138 | 5.4 | 914 |
| 1939-40 | 292 | 5.5 | 1,921 |
| 1940-41 | 310 | 5.0 | 2,076 |
| 1941-42 | 278 | 3.7 | 1,269 |
| 1942-43 | 258 | 3.5 | 1,123 |
| 1943-44 | 321 | 3.9 | 1,565 |
| 1944-45 | 313 | 3.5 | 1,585 |
| 1945-46 | 353 | 4.3 | 2,054 |
| 1946-47 | 465 | 3.4 | 1,885 |
| 1947-48 | 311 | 3.0 | 1,200 |
| 1948-49 | 370* | 2.7 | 1,172 |
| 1949-50 | 513* | 2.9 | 1,656 |
| 1950-51 | 551* | 3.5 | 2,102 |
| 1951-52 | 723* | 3.5 | 2,536 |
| Sub-total | <u>5,266</u> | | |

*Does not take into consideration permits issued on Indian Reservations.

Table 6. Beaver Harvest and Permits Granted During the Last
Twenty-two Years.

1944-1945

TRAPPING PRESSURE

In terms of economics a total harvest figure may be a valuable one. However, in terms of management it doesn't mean much unless we know the population from which this harvest was taken. A harvest may be adequate, insufficient or too heavy depending upon total population figures. The only way we can evaluate trapping pressure and harvest is through comparison with census figures. This is done in Table 7 below. Aerial census figures are Hargrave's (4).

| Stream | Aerial Survey | | No. of Permits | Permits | | Harvest | Miles of Stream |
|---------------------------------------|------------------------------|-----|-------------------|-----------------------------|----|---------|-----------------------|
| | Indicates Caches Colonies | | | Indicate Caches Colonies | | | |
| Heart River | | | | | | | |
| Mouth to Mandan | 44 | 3 | 2 | 3 | 3 | 5 | 11 |
| Mandan to Sweetbriar Creek | 2 | 2 | 1 | 2 | 2 | 0 | 11 |
| Sweetbriar to Muddy Creek | 10 | 10 | 3 | 5 | 5 | 44 | 54 |
| Muddy to Heart Butte Dam | 12 | 12 | 0 | - | - | - | 42 |
| Heart Butte Dam to Hwy. 8 | 10 | 8 | 4 | 10 | 9 | 12 | 51 |
| Sub-total | 38 | 35 | 10 | 20 | 19 | 21 | 169 |
| Missouri River-East Bank | | | | | | | |
| Stanton to Bismarck | 20 | 20 | 6 | 7 | 15 | 13 | 57 |
| Bismarck to Stanton (West Bank) | 8 | 20 | 2 | 3 | 5 | 2 | 57 |
| Sub-total | 28 | 40 | 8 | 10 | 20 | 15 | 114 |
| South Fork of Cannonball | | | | | | | |
| Bridge South of Elgin to Highway 8 | 34 | 29 | 7 | 15 | 15 | 4 | 93 |
| North Fork of Cannonball | | | | | | | |
| Fork to Bridge South of Elgin | 22 | 20 | 5 | 9 | 9 | 18 | 76 |
| Sub-total | 56 | 49 | 12 | 24 | 24 | 22 | 179 |
| Total | 122 | 124 | 30 | 54 | 63 | 58 | 452 |

Table 7. Comparison of 1951 Aerial Census Figures with 1951-1952 Permit and Harvest Data.

Granting that such population figures can be only good estimates at best we still should get a fair comparison between number of colonies present and the number for which permits were granted. On each of the three rivers approximately one-half of the colonies known to be present (as indicated in aerial surveys) were granted permits. This figure would indicate that approximately one-half the colonies were trapped on the portions of the streams censused. However, this ratio seems quite high when the number of beaver harvested was only 58. This means that a little less than one beaver was harvested for each colony covered by a permit. The apparent reason for this is that a large number of colonies are never trapped even though permits have been taken out on them.

EXHIBIT 100-1000

In terms of quantity, the total amount of material is approximately 100,000 pounds. This material is used in the production of various types of explosives, including dynamite, black powder, and other types of explosives. The material is used in the production of these explosives in a variety of ways, including as a component in the explosive mixture, as a filler, and as a binder. The material is also used in the production of other types of explosives, such as smokeless powder, and in the production of other types of explosives, such as smokeless powder, and in the production of other types of explosives, such as smokeless powder.

| Table 1. Composition of Explosive Mixture | | | | | | | | | |
|---|------------|------------|----------------|------------------|--------------------|--------------------|------------------|---------------------|------------------|
| Component | Weight (%) | Volume (%) | Density (g/cc) | Specific Gravity | Boiling Point (°C) | Melting Point (°C) | Flash Point (°C) | Explosive Limit (%) | Notes |
| 1. Nitrocellulose | 45.0 | 35.0 | 1.20 | 1.20 | 150.0 | 150.0 | 150.0 | 15.0 - 18.0 | Highly explosive |
| 2. Nitroglycerin | 30.0 | 25.0 | 1.40 | 1.40 | 250.0 | 250.0 | 250.0 | 15.0 - 18.0 | Highly explosive |
| 3. Trinitrotoluene (TNT) | 15.0 | 10.0 | 1.65 | 1.65 | 240.0 | 240.0 | 240.0 | 15.0 - 18.0 | Highly explosive |
| 4. Diethylene Glycol Dinitrate (DEGN) | 10.0 | 8.0 | 1.40 | 1.40 | 250.0 | 250.0 | 250.0 | 15.0 - 18.0 | Highly explosive |
| 5. Triethylene Glycol Dinitrate (TEGN) | 5.0 | 4.0 | 1.40 | 1.40 | 250.0 | 250.0 | 250.0 | 15.0 - 18.0 | Highly explosive |
| 6. Diethylene Glycol Mononitrate (DEGN) | 5.0 | 4.0 | 1.40 | 1.40 | 250.0 | 250.0 | 250.0 | 15.0 - 18.0 | Highly explosive |
| 7. Triethylene Glycol Mononitrate (TEGN) | 5.0 | 4.0 | 1.40 | 1.40 | 250.0 | 250.0 | 250.0 | 15.0 - 18.0 | Highly explosive |
| 8. Diethylene Glycol Dinitrate (DEGN) | 5.0 | 4.0 | 1.40 | 1.40 | 250.0 | 250.0 | 250.0 | 15.0 - 18.0 | Highly explosive |
| 9. Triethylene Glycol Dinitrate (TEGN) | 5.0 | 4.0 | 1.40 | 1.40 | 250.0 | 250.0 | 250.0 | 15.0 - 18.0 | Highly explosive |
| 10. Diethylene Glycol Mononitrate (DEGN) | 5.0 | 4.0 | 1.40 | 1.40 | 250.0 | 250.0 | 250.0 | 15.0 - 18.0 | Highly explosive |

Table 1. Composition of Explosive Mixture. This table provides a detailed breakdown of the components of the explosive mixture, including their weight and volume percentages, densities, specific gravities, boiling and melting points, flash points, and explosive limits. The components listed are Nitrocellulose, Nitroglycerin, Trinitrotoluene (TNT), Diethylene Glycol Dinitrate (DEGN), Triethylene Glycol Dinitrate (TEGN), Diethylene Glycol Mononitrate (DEGN), Triethylene Glycol Mononitrate (TEGN), Diethylene Glycol Dinitrate (DEGN), Triethylene Glycol Dinitrate (TEGN), and Diethylene Glycol Mononitrate (DEGN). The explosive limits for each component are also provided, ranging from 15.0% to 18.0%.

Usually this is due to the weather - or in years of low prices a combination of weather and low pelt prices i.e. On Apple Creek in 1951-1952 there were ten permits granted. Of these, little trapping was attempted on at least three permits.

Saugstad (5) worked out figures of the take per estimated number of colonies for the 1941-1942 season. His figures, although based on entire river drainages, should be comparable with the 1951-1952 take per colony on portions of the same streams.

| Stream | Take per Estimated No. of Colonies | |
|--------------|---------------------------------------|------|
| | 1941 | 1951 |
| Heart | .53 | .60 |
| Cannonball | .37 | .45 |
| Big Missouri | .18 | .38 |

In the aerial survey of 1949, (Hargraves (3)) census figures were obtained for some new areas of the state. This data, together with permit and harvest records for these stretches of the streams, is presented below.

| Stream | Aerial Survey # of Colonies | No. of Permits | Permit Data # Colonies | Harvest | Miles of Stream |
|--|--------------------------------|-------------------|---------------------------|------------|--------------------|
| Forest River Crossing Hwy. 35 to Fork | 3 | | | | 18 |
| Town of Forest River | 12 | 9 | 13 | 25 | 21 |
| Minto | 5 | | | | 11 |
| | <u>20</u> | | | | <u>50</u> |
| Sheyenne River Crossing Hwy. 1 South of Pekin | | | | | |
| To Bridge East of Cooperstown | 23 | | | | 44 |
| To high Railroad Bridge | 10 | | | | 17 |
| To Baldhill Dam | 12 | 31 | 52 | 115 | 23 |
| To Valley City | 8 | | | | 13 |
| | <u>53</u> | | | | <u>97</u> |
| Maple River Crossing Hwy. 10 South of Mapleton | | | | | |
| To Railroad Bridge Durbin | 3 | | | | 14 |
| To Hwy. 46 Bridge East of Enderlin | 7 | 6 | 11 | 11 | 58 |
| Mouse River South End of Upper Souris Refuge To Minot | 6 | 4 | 7-8 | 7 | 29 |
| South of Minot to Velva | 3 | | | | 37 |
| | <u>92</u> | <u>50</u> | <u>83</u> | <u>158</u> | <u>66</u> |

Table 8. Comparison of Some 1949 Aerial Census Figures
With 1949 Permit and Harvest Data.

1. *Chlorophyll a* (Chl a) is the primary photosynthetic pigment in most plants, algae, and cyanobacteria. It is a green pigment that absorbs light energy in the blue-violet and red-orange regions of the visible spectrum.

2. *Chlorophyll b* (Chl b) is an accessory pigment found in green plants and algae. It absorbs light energy in the blue and orange-yellow regions of the visible spectrum and transfers the energy to Chl a for use in photosynthesis.

3. *Carotenoids* are a group of pigments that include carotenes and xanthophylls. They absorb light energy in the blue and green regions of the visible spectrum and transfer the energy to Chl a. Carotenoids also play a role in protecting the photosynthetic apparatus from damage by excess light energy.

4. *Xanthophylls* are a type of carotenoid that are involved in the light-harvesting process. They absorb light energy in the blue and green regions of the visible spectrum and transfer the energy to Chl a. Xanthophylls also play a role in protecting the photosynthetic apparatus from damage by excess light energy.

5. *Phycobilins* are a group of pigments found in cyanobacteria and red algae. They absorb light energy in the blue and green regions of the visible spectrum and transfer the energy to Chl a. Phycobilins are involved in the light-harvesting process and also play a role in protecting the photosynthetic apparatus from damage by excess light energy.

Some of this data is quite different from that found in Table 7 on 1951 census figures; especially when comparing colonies found in the aerial censuses with the number of colonies indicated as being trapped by inspection reports. Data for the Sheyenne River shows 53 colonies located from the air and 52 colonies being trapped. If valid this means a nearly 100% trapping pressure. This may be partially explained by the fact that there apparently was an extra effort to remove beaver because of the prospective closing of the Baldhill Dam. For, when closed, its back waters would eliminate a good portion of the beaver habitat along the portion of the stream censused. The other three rivers also have better than half the number of colonies trapped that are known to be present. Again these figures may be entirely valid or may be due to errors in estimating populations on the part of the wardens in their inspection reports or to not being able to see all colonies present in aerial surveys.

On two of the rivers, the harvest per colony trapped was approximately one, as was true for all rivers in the 1951 survey. However, the harvest for both the Sheyenne and Forest Rivers was approximately two beaver per colony trapped. Using a figure of 5 beaver per colony this would be a 40% harvest on colonies being trapped. Wire and Hatch (6) state that 1/5 of the 1940-1941 total population in the eleven western states was harvested and that populations are still on the increase. Wisconsin comments in returns from the beaver questionnaire that 33%-50% of the beaver present in an area must be taken each year to reduce a normal population. At this rate both the Sheyenne and Forest Rivers were reducing populations on the areas being trapped. On the basis of number of beaver taken per total population only the heavily trapped Sheyenne River had any beaver reduction following the 1949 season as 44% of that year's total population was trapped. The rest of the streams would still be gaining in population on Wisconsin's basis of a 33%-50% removal being necessary to reduce populations. The figures are: Forest River-25% trapped, Maple River-22% trapped, and Mouse River- 16% trapped.

Referring back to Table 6, the percent of total population removed in 1951 for the Heart would be 12%, Missouri-7.5%, and Cannonball-9%. All figures are well below the percentage of removal necessary to reduce beaver populations.

Another interesting item in Table 8 is the harvest per mile of stream censused for the Sheyenne. This is 1.2 beaver per mile for this portion of the river. The figure for the Forest River is fairly high at a take of .5 beaver per mile. The Mouse and Maple Rivers in 1949 and all streams censused in 1951 show a comparable take of .1 beaver per mile or lower. The latter are probably more normal harvest-per-mile figures. These figures are comparable to the nine year average take of .3 beaver per mile on Apple Creek.

POPULATIONS

This study was carried on mainly from an economic standpoint so little work was done on any general censusing. However, using data that is already available, there are several ways by which an approximate idea of North Dakota's beaver population could be arrived at. These are:

1. One could obtain miles-per-colony figures for the various streams based on sample aerial surveys. Then we could apply this figure to unflown portions of the streams to get an estimate of the total population. For instance, the 1949 aerial survey yielded miles-per-colony figures varying from 1.5 to 8.3 for an average of 2.84 miles-per-colony from the 871 stream miles flown. This included portions of the Mouse, Forest, Maple, and Sheyenne Rivers but the Missouri River and tributaries formed the bulk of the stream miles. If the lengths of unflown portions of these streams were measured, some sort of an estimate could be derived from such figures on individual streams. This would be a very rough figure and would not take into account variations in habitat over a streams length and would not apply too well on such areas as the Turtle Mountains.

2. Obtaining population estimates on the basis of colony data obtained from warden inspection reports. There are considerable limitations to the use of this method also. First of all, we are using data provided by 18 different men who are bound to differ in their ability and desire to make good estimates of the number of beaver colonies. Second, we have to estimate what percentage of the total colonies in the state were granted permits. In local areas this could be worked out fairly accurately from comparison of aerial census figures with data from beaver inspection reports, as was done in Tables 7 and 8. On areas where there was no census data available, the ratio of trapped/untrapped colonies would have to be arrived at by consulting past permit records on the various drainages and attempting to get estimates of percentages of total colonies trapped from wardens and spot-check field work.

Aerial census figures and inspection report data for 1951 show that not quite one-half of the censused beaver colonies were later trapped. Field work in various areas and contacting wardens seems to indicate that certainly 50% and probably more of the total number of colonies in the state are not trapped.

For the year 1951-1952, there were approximately 1,644 colonies being trapped. Doubling this figure would give one a conservative estimate of 3,288 colonies for the state. Considering that 40% of the colonies are being trapped would yield a figure of 4,110 colonies. This compares to the 2,900 colonies estimated by Saugstad (5) in 1943. His figures are based upon two years of statewide censusing and inspecting beaver permits, so can be presumed to be the best figures available as a comparison with present day populations. However, 2,160 of his estimated number of colonies are from the Big Missouri drainage. He credits the Pembina Hills area with 211 colonies, which may not be too short of today's figures.

Several areas have greatly increased their populations since he made his study. The Sheyenne River, for instance, he credited with only 75 colonies. The 1949 aerial survey indicated 53 colonies on only 97 miles of this river. There were approximately 100 permits granted on the Sheyenne for that year. This means that there were at least 200 colonies being trapped and quite possibly that many more which were untrapped.

1. Introduction

The first part of the report deals with the general situation of the country. It is a very important part of the report and it is very interesting to read. It gives a good overview of the country and its people. It also gives some information about the economy and the social situation. It is a very good introduction to the country and it is very helpful for the reader.

The second part of the report deals with the political situation of the country. It is a very important part of the report and it is very interesting to read. It gives a good overview of the political situation and it is very helpful for the reader. It also gives some information about the government and the political parties. It is a very good introduction to the political situation of the country and it is very helpful for the reader.

The third part of the report deals with the economic situation of the country. It is a very important part of the report and it is very interesting to read. It gives a good overview of the economic situation and it is very helpful for the reader. It also gives some information about the economy and the financial situation. It is a very good introduction to the economic situation of the country and it is very helpful for the reader.

The fourth part of the report deals with the social situation of the country. It is a very important part of the report and it is very interesting to read. It gives a good overview of the social situation and it is very helpful for the reader. It also gives some information about the social problems and the social services. It is a very good introduction to the social situation of the country and it is very helpful for the reader.

The fifth part of the report deals with the cultural situation of the country. It is a very important part of the report and it is very interesting to read. It gives a good overview of the cultural situation and it is very helpful for the reader. It also gives some information about the culture and the arts. It is a very good introduction to the cultural situation of the country and it is very helpful for the reader.

The sixth part of the report deals with the environmental situation of the country. It is a very important part of the report and it is very interesting to read. It gives a good overview of the environmental situation and it is very helpful for the reader. It also gives some information about the environment and the natural resources. It is a very good introduction to the environmental situation of the country and it is very helpful for the reader.

Populations were low in the Turtle Mountains also at the time of his survey. He estimated 25 colonies. In 1951, there were 43 permits for this area. Representing approximately 100 colonies. If only half the colonies are trapped there would possibly be 200 colonies altogether. Judging from the increased number of permits granted, the Red River and its tributaries have had considerable population increases also.

Allowing for the population increases in the above streams and a relatively stable population for the Big Missouri drainage (largely based on harvest plus the fact that three-year aerial survey flights on 632 miles of the Big Missouri drainage show fluctuations but little trend) it seems quite possible that a figure somewhere between two and three times the number of trapped colonies would be close to the true population. Such a figure might closely approximate the figure arrived at by assuming 40% of the colonies were trapped--that is somewhere around 4,000 colonies.

The 4,000 figure may easily be too low but it is doubtful if it is too high, for Saugstad (5) estimated a ratio of 3 and 4:1 of untrapped/trapped colonies of the Heart, Knife and Cannonball Rivers and as high as 20:1 on the Big Missouri River. These ratios would probably now be lower due to the increased number of permits granted, especially on the Big Missouri River (see Table A--Appendix), but it is doubted if they would be lowered beyond the 2 or 3:1 ratio suggested above.

At five beaver per colony this number of colonies would mean approximately 20,000 beaver, as compared with Saugstad's estimate of 14,000-15,000 in 1942. The above figures should not be construed to be a census of any sort, as were Saugstad's figures, but are merely calculations based upon two known quantities. As has already been implied these are:

1. Approximate number of colonies known to be trapped and an assumed ratio of trapped/untrapped colonies.
2. Past estimates of beaver populations by drainages with added estimated increases on areas where beaver were previously scarce.

BEAVER LIVE TRAPPING AND STOCKING

Most of the beaver live-trapping and removal work has been carried on since Saugstad (5) wrote his report. However, he does have some data on earlier stockings which I will include here. The first reference to live-trapping that he could find was an indication in one of the late 1920 annual reports that possibly a few beaver had been live-trapped and removed during the period covered by the report. The first definite record of beaver stocking that he found was in the annual report for 1934-1935. In the summer of 1934, 15 beaver taken from Wildwood Lake, south of Washburn, were released on the Forest River between Inkster and Fordville.

During the period 1935-1936, there apparently was a definite attempt to limit trapping and increase the range of beaver. During this period, Saugstad states, "Very few permits were issued and evidently very few beaver were trapped for pelting purposes. In the annual report for that period the commissioner states quite definitely that it is his intent to practically put a stop to the practice of trapping beaver for their pelts and that in place of that program

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he was going to start a rather intensive program of live trapping, so that beaver could be transported to areas where they would be welcomed by the landowners.

"The annual report following this period fails to make more than passing mention of the fact that a little live-trapping was done and that some releases were made. It is also note-worthy that the number of permits and amount of seals sold increased very markedly this same year. Evidently this commissioner must have found that a wholesale live-trapping campaign was not a practical solution to the problem." It was during this period that landowners were offered \$3.00 per live beaver delivered to Bismarck.

The annual report for 1936-1937 states that some live-trapping was done near Mott, Dunn Center and Bismarck. Releases were made at Park River, Valley City and Kindred. Saugstad's report, covering the periods through the 1942 season, makes no later mention of live-trapping than this 1936-1937 record.

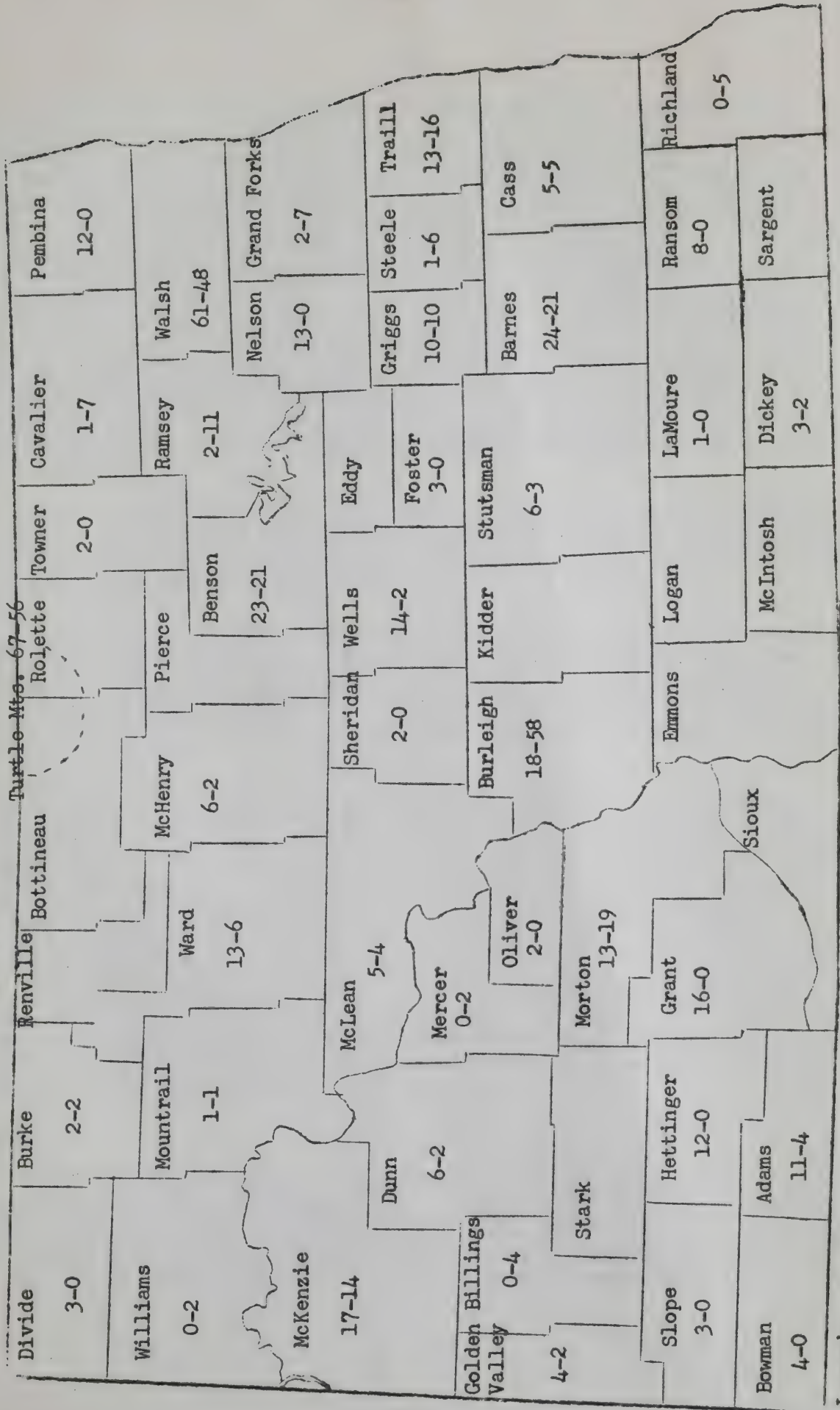
The next mention of live-trapping is in the 1944-1945 annual report and is a record of the removal of nuisance beaver by A. K. Momb. His activities commenced in August, 1943, and ceased in October, 1951. During this period approximately 574 beaver were removed from areas where they were causing damage. Of this number 108 were pelted and the rest, 466, were transplanted to areas where the landowners wished to have beaver or to other areas where they would do less damage. Table 9 below shows the yearly numbers of beaver taken by Momb and what was done with them.

| Year | No. Taken | No. Released | No. Pelted |
|--------------------------|-----------|--------------|------------|
| 1943-44 | 47 | 43 | 4 |
| 1944-45 | 65 | 30 | 35 |
| 1945-46 | 69 | 54 | 15 |
| 1946-47 | 37 | 28 | 9 |
| 1947-48 | 58 | 31 | 27 |
| 1948-49 | 101 | 98 | 3 |
| 1949-50 | 92 | 86 | 6 |
| 1950-51 | 74 | 65 | 9 |
| July 1, '51-Oct. 1, '51. | <u>31</u> | <u>31</u> | <u>-</u> |
| | 574 | 466 | 108 |

Table 9. Eight Year Record of Beaver Live-Trapping.

Figure 7 shows where live-trapped beaver have been taken and released since March, 1946, which is as far back as an accurate county record can be obtained.

Figure 7. Distribution of Live-trapped and Released Beaver in the State.



A glance at the above figure shows that there has been nuisance beaver removal throughout the state. Forty-three of the state's 53 counties have had beaver live-trapped and released in them. The majority of the beaver, however, have been removed from the Turtle Mountains and the northeastern counties of the state. Three counties, Bottineau, Rolette, and Walsh, account for 128 of the total of 409 trapped during this period. Most counties have had fewer beaver released in them than were trapped; for during the fall, winter and early spring most of the beaver were pelted and sold rather than released. The few counties that are the exception to this, (Traill, Steele, Grand Forks, Cavalier, Ramsey, Richland, Morton, and Burleigh) have either had more requests for releases than there were beaver live-trapped within the county; (i.e. live beaver brought into the county from another county), or have had beaver released in the county largely because there was no other place to put them. Such is the case with the 58 beaver released in the Big Missouri in Burleigh County. During the eight year period there was a total of 82 unwanted beaver placed in the Missouri, largely at Bismarck.

Other water areas of the state have also had beaver dumped into them because there was no place to put them. This has happened to a limited extent along certain portions of the Sheyenne and Red Rivers, in certain areas of the Turtle Mountains and in Devils Lake.

In the record of captures and released in Figure 8, there is no breakdown given under each county as to the specific water areas where beaver were taken because this would take up ten times the space. However, detailed data of this is on hand and includes dates of capture, county and water areas where beaver were taken, the same data for releases and where possible a more specific description or remark.

A perusal of this data brings forth some interesting facts. One of these is that, while live-trapping beaver in many areas is probably essential for good public relations and in some cases may completely eliminate the trouble, in others it is merely a temporary or stop-gap measure and will only serve to alleviate the matter for a few months or one season. This may not be due to any fault of the trapper, but is mainly a feature of terrain, the inherent tendency of beaver to move into unstocked habitats, and the diminishing returns involved in attempting to get the last member or two of a colony of beaver. Thus there are numerous areas where beaver have been removed repeatedly. Sometimes, this may have been due to getting only a portion of the colony the first trip, but in other cases the nuisance removal record of a given area goes back over several years. This chronic nuisance condition of an area probably is augmented by influxes of new beaver stock.

Tagging

Proof that beaver move considerable distances to stock areas is best obtained from returns from tagged beaver. Between May 16, 1947, and October 13, 1948, Alvin Momb tagged and released 96 beaver. Dates and areas of capture and release have been obtained from his daily reports. Following is a list of the numbers of beaver released in various areas of the state.

The first of the three main parts of the report is a general survey of the situation in the country. It is followed by a detailed analysis of the economic situation, and finally by a series of recommendations for the future. The report is written in a clear and concise style, and is well illustrated with statistics and diagrams. It is a valuable contribution to the study of the country's development.

The second part of the report is a detailed analysis of the economic situation. It covers a wide range of topics, including the agricultural sector, the industrial sector, and the services sector. It also discusses the role of the government in the economy, and the impact of international trade.

The third part of the report is a series of recommendations for the future. It discusses the need for a more diversified economy, and the importance of improving the infrastructure. It also suggests ways in which the government can better manage the economy, and how the private sector can be encouraged to invest in the country.

The report concludes with a series of conclusions and recommendations. It emphasizes the need for a more diversified economy, and the importance of improving the infrastructure. It also suggests ways in which the government can better manage the economy, and how the private sector can be encouraged to invest in the country.

The report is a valuable contribution to the study of the country's development. It provides a clear and concise overview of the current situation, and offers a series of practical recommendations for the future. It is a must-read for anyone interested in the country's economic development.

| Number | Area Released In |
|--------|--|
| 19 | Turtle Mountains |
| 18 | Big Missouri (16 at Bismarck, 2 at Elbowoods) |
| 14 | Sheyenne (13-8 miles outh of Valley City, one in Griggs County). |
| 2 | Pipesten (at Pingre Stutsman County) |
| 2 | Cottonwood Lake, Williams County |
| 41* | Northeastern North Dakota |

*Includes releases in the Park River (Cavalier and Walsh Counties), Goose River drainage, (Sharon, Steele County) Buffalo Coulee, (Buxton, Traill County) and Sweetwater Lake drainage (Alamo, Ramsey County).

Table 10. Areas in State Where Tagged Beaver Have Been Released.

From the above, it can be seen that most of the Tagged beaver were released in three main areas, the Missouri, the Turtle Mountains, and the northeast section of the state. This also held true for the majority of the untagged beaver released (Figure 7). Only five of these tags have been recovered. The data on the returns is cited below. Most of the data on dates of capture, where captured, etc., is taken from Momb's daily reports.

(1) Tag number 47-6: Originally caught by Momb May 18, 1947 in the Park River City Park. This animal was taken to the Sander Kittleson farm (Section 9, Township 157, Range 56) $7\frac{1}{2}$ miles from Park River. It was caught again by Ed Bry in the Park River City Park with a live-trap on April 11, 1952. It had returned approximately $7\frac{1}{2}$ miles. This animal was again released. This time in Ed Solis' coulee, $1\frac{1}{2}$ miles west and $1\frac{1}{2}$ miles north of Mountain, Pembina County.

(2) Tag number 47-8: Momb took this animal on the Lemke ranch, north of Lemmon, South Dakota in Plum Creek, on May 27, 1947. He released it at the railroad bridge at Bismarck. It was caught by a trapper, Eugene Mastel, $4\frac{1}{2}$ years later, 12 miles up stream in Burnt Creek (Section 10, Township 140, Range 80).

(3) Tag number 47-13: This beaver was taken by Momb, June 23, 1947, in the Moutain vicinity in Cart Creek, (Section 14, Township 160, Range 56). It was released on the Kittleson farm $7\frac{1}{2}$ miles northwest of Park River (Section 9, Township 157, Range 56). It was taken on April 14, 1952, by a trapper, L. Mohagen at Section 6, Township 157, Range 53 near Grafton, 22 miles from its release point or at least 28 miles by stream from the Kittleson farm up another branch of the Park River.

1. The first part of the report is devoted to a general survey of the situation in the country.

2. The second part of the report is devoted to a detailed analysis of the economic situation in the country.

3. The third part of the report is devoted to a detailed analysis of the social situation in the country.

4. The fourth part of the report is devoted to a detailed analysis of the political situation in the country.

5. The fifth part of the report is devoted to a detailed analysis of the cultural situation in the country.

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7. The seventh part of the report is devoted to a detailed analysis of the military situation in the country.

8. The eighth part of the report is devoted to a detailed analysis of the scientific situation in the country.

9. The ninth part of the report is devoted to a detailed analysis of the artistic situation in the country.

(4) Tag number 47-34: Caught by Momb, October 10, 1947, in Mouse River, Ward County (Section 10, Township 154, Range 82). It was released in the Big Missouri at Bismarck, sometime within the next eight months it was found killed by dogs in the Mandan area.

(5) Tag number 47-75: First caught by Momb at the Orgaard farm near Center Oliver County, September 13, 1948, and released in the Big Missouri. This beaver was again caught by Momb less than two years later on May 28, 1950, on the Joe Koppy farm on the Little Heart River in Morton County, (Section 17, Township 137, Range 80.) It had moved approximately 14-15 stream miles when last caught. It was again released by Momb on the Sheyenne River below Valley City.

Five tag returns on beaver is not enough to base theories upon, but the fact that two out of the five animals were retaken by live-traps of department personnel while attempting to catch nuisance beaver would seem to indicate that some of the other live-trapped and released animals had also moved out and subsequently become nuisance problems. In the above four cases of trapped beaver, none of these animals had become nuisances in areas where they were released but had moved away from points of release, (apparently in search of a more suitable habitat) to be taken in new areas where they were causing damage. On the other hand, the fact that so few beaver were retaken, and these all away from their release sites, might indicate that where beaver were released in suitable habitats (as in the small stream areas of the Turtle Mountains, in northeastern North Dakota and other suitable areas) the majority of them stayed and did not become pests by moving out into areas where they weren't wanted. Others undoubtedly later became pests at their points of release.

Another nuisance problem resulting from released beaver probably came as a result of indiscriminate dumping of beaver in the larger streams (i.e. the Missouri, Sheyenne, etc.) when it became hard to find any other places to put them. Many of these beaver undoubtedly later worked their way up small streams, as tag number 8 and 75 exemplify. This only temporarily eliminated beaver as nuisance problems, but at least it slowed down movements into adverse habitats. Others may have stayed in the larger rivers where they are generally less of a problem than on the smaller tributaries. Perhaps if more of the released beaver could have been tagged, we would have a better concept of what happens to released beaver.

A new series of beaver tags has recently been acquired. From these it is hoped that additional knowledge on beaver movements may be obtained from beaver which may be live-trapped and released in the future.

Economics of Live-Trapping

Although the cost of removing nuisance beaver is hardly economically justifiable most states find it necessary to carry out a nuisance beaver control program (see section on beaver questionnaire). Such has also been the case in North Dakota. What has been the cost of removal for each individual beaver? This can best be determined by estimating the total money spent on nuisance beaver work by the live-trapper. In eight years he removed approximately 574 beaver. However, it is evident from his daily reports that not much more than one-half of his time was devoted to live-trapping beaver for he was concerned with other duties at some times of the year and much of the time in the fall months was spent on making beaver inspections for trapping permits. His salary and lodging expenses for four years is estimated to be approximately 15,000 dollars. This sum is partially compensated by the estimated \$2,500 which was received for the

[Faint, illegible handwritten notes]

108 pelts sold. (Most of these beaver were pelted in years of relatively high prices). The cost of travel with a state-owned car is difficult to estimate but would be considerably greater than the return from pelts. Thus the total cost without considering car expenses (except as compensated by the return on pelts) would be a quite conservative \$15,000. This means a cost of \$26.13 per nuisance beaver live-trapped.

NUISANCE STATUS

In the past decade or two, the beaver population has increased considerably in many areas of the state. Along with this increase in population, there apparently has been a corresponding change in their nuisance status. In the past their damages may have been tolerated because of the relative scarcity of the animal. Today much of the beavers activities are considered to be harmful, especially their tree cutting and in many cases their damming and flooding activities.

Numerous types of damages can be listed that can and do occur throughout the state. Table 11 below presents an analysis of the warden inspection reports for the past six years. The main types of damage are listed, including damages listed on permits which were made largely on the basis of a harvestable surplus. Also included are other data obtainable from inspection reports-such as, who does the actual trapping, landowner or otherwise and if the trapper is other than the owner, does the owner get a percentage of the pelts?

A perusal of this table shows that the main basis for issuing permits has been the damage done to trees. Flooding and crop damage have also been important factors, while the plugging of ditches and cluverts and the undermining activities of tunneling - resulting in cave-ins of stream banks, roads, etc., while only minor factors, have also contributed to the list of damages sustained. Flooding has been a secondary damage factor in all drainages except the Souris, where it was mentioned in inspection reports nearly as often as tree-cutting. In the original break-down of damages by county, it was seen that most of this flooding damage occurred in the Turtle Mountains. In fact, for three of the past six years, flooding damagewas mentioned in inspection reports more often than tree-cutting for Bottineau and Rolette counties.

Where do most beaver damage complaints come from? Since beaver are harvested throughout the state (Figure B Appendix) presumably largely on the basis of damage sustained, we might conclude that complaints are received from all areas of the state also. That such is the case can be seen by a glance back at the map of Momb's nuisance removal program (Figure 7). However, as was pointed out in the section on live-trapping, the bulk of the nuisance removal work was carried on along rivers of the Red drainage, along the Sheyenne River, in the Turtle Mountains, in the Big Missouri drainage, and to a lesser extent the Souris drainage. These are the areas which carry some of the heaviest beaver population. In a state where agriculture and ranching form the major land use in all counties, the natural conclusion to be drawn in answering the question of where beaver complaints arise, is wherever there are beaver populations.

Table 11 brought out the types of complaints mentioned by wardens in inspection reports. This was a summarization of damages as noted in fall and winter inspections. That actual beaver complaints are more varied and detailed can be seen by examining some of the letters written into the State Game and Fish Department concerning beaver damages.

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| Drainage | Type of Complaint | | | | Landowner wishes to | | Owner gets % of | | Trapper is | | Owner and Other have Same Name | | |
|---------------------|-------------------|----------|----------------|-------|----------------------|---------------------|-----------------|---------|------------|-------|--------------------------------------|------|-----|
| | Tree cutting | Flooding | Crop Damage | Other | Take Surplus | Be rid of Beaver | Trappers pelts | | Owner | Other | | | |
| | | | | | | | Yes | Unknown | | | | No | |
| Missouri | 47-48 | 172 | 15 | 10 | Ditch 2 Culvert 1 | 128 | 46 | 46 | 11 | 41 | 68 | 102 | |
| Red | 47-48 | 109 | 17 | | Cave in 1 | 78 | 26 | 33 | 20 | 12 | 42 | 69 | |
| Souris | 47-48 | 18 | 2 | 1 | | 16 | 2 | 9 | 3 | | 7 | 12 | |
| Total | 47-48 | 299 | 34 | 11 | 4 | 222 | 74 | 88 | 34 | 53 | 117 | 183 | 40 |
| Missouri | 48-49 | 183 | 39 | 11 | Ditch 3 | 139 | 51 | 39 | 30 | 33 | 80 | 101 | |
| Red | 48-49 | 151 | 20 | 13 | Bridge 1 Ditch 2 | 113 | 36 | 53 | 16 | 17 | 72 | 84 | |
| Souris | 48-49 | 14 | 4 | 2 | Cave in 1 | 15 | 4 | 6 | 6 | | 7 | 13 | |
| Total | 48-49 | 348 | 63 | 26 | 7 | 267 | 91 | 98 | 52 | 50 | 159 | 198 | 65 |
| Missouri | 49-50 | 252 | 20 | 19 | Cave in 1 | 147 | 108 | 50 | 69 | 26 | 113 | 147 | |
| Red | 49-50 | 198 | 26 | 4 | Ditch 2 | 128 | 73 | 42 | 36 | 26 | 87 | 116 | |
| Souris | 49-50 | 39 | 24 | 1 | Ditch 3 Cave in 1 | 26 | 12 | 4 | 18 | 4 | 15 | 28 | |
| Total | 49-50 | 489 | 70 | 24 | 7 | 301 | 193 | 96 | 123 | 56 | 215 | 291 | 77 |
| Missouri | 50-51 | 275 | 65 | 45 | Ditch 4 | 157 | 114 | 56 | 72 | 51 | 108 | 174 | |
| Red | 50-51 | 193 | 40 | 3 | Cave in 1 Ditch 1 | 106 | 91 | 46 | 64 | 32 | 59 | 142 | |
| Souris | 50-51 | 44 | 40 | 1 | Ditch 1 | 28 | 38 | 5 | 33 | | 26 | 39 | |
| Total | 50-51 | 512 | 145 | 49 | 10 | 291 | 243 | 107 | 169 | 83 | 193 | 355 | 72 |
| Missouri | 51-52 | 323 | 50 | 7 | Ditch 1 | 212 | 103 | 51 | 84 | 66 | 129 | 202 | |
| Red | 51-52 | 276 | 52 | 5 | Cave in 2 | 121 | 161 | 42 | 88 | 61 | 88 | 193 | |
| Souris | 51-52 | 69 | 66 | 4 | | 24 | 85 | 17 | 50 | 5 | 38 | 72 | |
| Total | 51-52 | 668 | 168 | 16 | 3 | 357 | 349 | 110 | 222 | 132 | 255 | 467 | 112 |
| Missouri 5yr. total | | 1205 | 189 | 92 | 12 | 783 | 422 | 242 | 266 | 217 | 498 | 726 | |
| Red 5yr. total | | 927 | 155 | 25 | 13 | 546 | 387 | 216 | 224 | 148 | 348 | 604 | |
| Souris 5yr. total | | 184 | 136 | 9 | 6 | 109 | 141 | 41 | 110 | 9 | 93 | 164 | |
| Total (Grand) | | 2316 | 480 | 126 | 31 | 1438 | 950 | 499 | 600 | 374 | 939 | 1494 | 366 |

Table 11. Summarization of Data obtained from Beaver Inspection Reports.

Following is a summary of letters received on beaver complaints in the Game and Fish office dated between January 22 and November 2, 1951.

| Letters Mentioning | No. | Letters Mentioning | No. |
|-----------------------|-----|-----------------------|-----|
| "Damages" | 3 | In reservoir | 1 |
| Damage to trees | 12 | In irrigation project | 1 |
| Damage to Shelterbelt | 7 | In culvert | 1 |
| Flooding roads | 5 | In park | 1 |
| Flooding land | 10 | Backing up sewers | 1 |
| Dam at bridge | 2 | Lost cattle in pond | 1 |

Table 12. Summary of Some Beaver Damage Complaints.

Six of the above letters also mentioned having trouble trapping beaver and three mentioned the practicability of shooting beaver where they couldn't readily be taken otherwise. One recurring theme seems to be brought out in all these letters. They want the beaver removed but in many cases do little about the trouble themselves. They seem to feel that the state is responsible for getting rid of the animals. For instance, one letter from a group of farmers in the southeastern part of the state petitioned the State Game and Fish Department to remove the beaver along a section of stream. They state that, "No one in this locality has the traps and the know-how". They all want beaver removed but do little to help themselves - apparently expecting the state to take care of them. Perhaps their feelings are somewhat justified as they are somewhat handicapped in their methods of removing nuisance animals. However, it is the personal opinion of the writer that this is just another facet in the growing general feeling of "dependency" upon government and governmental agencies.

QUESTIONNAIRE RETURNS

A questionnaire was sent to various states that have beaver populations to see what they have done when confronted with beaver nuisance problems. This was to obtain information on types of harvest, policies and live-trapping which could be used in our own state. In the Appendix is a form similar to the one sent out.

The results of this survey are presented in tabular form below along with notations and the comments made by several states.

| State | Beaver Problem | Type of Harvest | Policies-Remarks | Live-Trapping |
|------------|----------------|--|--|--|
| New Mexico | No | 1. <u>State trappers</u> . No % to land owner. 2. Land owner permits for nuisance beaver. Owner gets 50%. | 1941-All beaver trapped under permit are sold by Dept. (50-50) | Yes-for nuisance beaver |
| Colorado | Yes | 1. <u>State trappers</u> . Land owner gets 50%-state does all work and handling. 2. <u>Permits</u> now allowed. Hides sold at public auction. | 1941-State trappers. 1951-Allowed land owner permits, also killing of beaver in irrigation areas. | Yes-for nuisance beaver trans-planting |

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| State | Beaver Problem | Type of Harvest | Policies-Remarks | Live-Trapping |
|--------------|-------------------|--|--|---|
| Nevada | Yes-on Agr. Lands | 1. All trapping done by <u>State Trappers</u> . 25% of pelts from private land go to owner. | Beaver harvested only since early 40's...1947 present law enacted | Yes, nuisance beaver. Transplant in mountains |
| Wyoming | Yes | 1. <u>State Trappers</u> on public lands, also private land on request 2. <u>Land owner</u> may get free damage permit 3. Beaver Farm Permit | Tendency toward more state control under supervision of inspection permit system | Yes-Mainly for nuisance beaver |
| California | Yes | In certain agr. areas may be taken any time, anywhere by anyone with license-- must be tagged. | 1951-passage of law allowing take at any time in Agr. areas | Yes-transplanting to closed areas. |
| Washington | Yes Agr. Areas | 1. <u>State Trappers</u> . Land owner gets 40%. State does all work of handling, pelting, marketing, etc. | 1945-State enters into cooperative agreements with land owner on harvest of beaver | Yes-nuisance transplanted. |
| Idaho | Slight | <u>Permit System</u> 1. Class A-land owner gets 75% 2. Class B-trappers are appointed-get 75%. Comm. sets up nos. & season. | Before 1941-State trappers. 1941-present law of permits. Hides sold at public auction. | Yes-nuisance beaver and transplanting |
| Oregon | Yes | <u>FORMERLY</u> State trappers-1/3 to owner (6,000 taken last season) 1. Open season-1951-Nov. 15-Jan. 15. \$2 seal/beaver-15,000 taken | Formerly closed season, game Comm. removed nuisance beaver upon written complaints. 1951-Comm. got power to open season, set bag, etc. | Yes, for damage control now. |
| Arizona | Yes | 1. <u>State trappers</u> are issued a given number of permits for specified area-% to owner and trapper. | 1929-State trapper law in effect since date | Yes-Nuisance beaver & transplants |
| Utah | Yes | 1. <u>State trappers</u> take some beaver-no % to land owner 2. Permits to trappers-trapper gets $\frac{1}{2}$ | Sustained yield | Yes-Nuisance beaver and transplants |
| South Dakota | Yes | 1. State trappers-Dept. keeps pelts 2. Permits to land owner only 3. Open season this year (Jan. year of open Feb.) in a few counties. | Prior to 1951-Law prohibited taking beaver except for damage--1951-1st season. | Yes-nuisance beaver |

Table 13 (Continued).

| State | Beaver Problem | Type of Harvest | Policies-Remarks | Live-Trapping |
|--------------|----------------------|--|---|---|
| Minnesota | Yes | 1. Permits to land owner upon damage complaints. 2. Open season-up to 45 days Sometime between Nov. 1 - May 31. | Harvests since 1939, since then attempt to keep beaver down, for it has little or no place in agr. areas. Consider <u>April 15-30</u> best time to trap | No special program |
| Iowa | Yes | 1. 1946-49 permits to farmers 2. 1949-one week season 1950-51-state wide fall season-Nov. 10-Jan. 10 | 1940-42-stocking 1946 complaints numerous (lack of knowledge & time by farmers and low price-high population) | 1940-42 stocking, not now. |
| Nebraska | Yes | 1. Special permits for irrigation & drainage areas \$2 per beaver killed (payment to state) 2. Beaver damage permits to land owners | | Limited-Nuisance beaver |
| Wisconsin | Yes | 1. <u>3 State Live Trappers</u> 2. Open season in Feb.-Mar. bag limit 12. | General seasons over most of state, closed seasons when felt to be necessary. | Yes, mainly nuisance beaver |
| Missouri | Yes Certain areas | 1. Permits given to land-owner upon complaint of damage, trapping at any time, preferably when prime | Prior to 1928-No beaver. 1945-first trapping (permit) Now tends toward controlled harvest. | Yes-Mainly for trans-planting since 1945. |
| Pennsylvania | Yes Some | 1. Open season with bag limit of two-open to residents with hunting license Feb. 15-Mar.1 | 1934-1st open season Restrictive trapping clauses, i.e. only 10 traps. | Yes-for nuisance beaver |
| New York | Yes | 1. Occasional permits to land owner for nuisance beaver 2. Open season annually in Mt. region. Bag limits Feb.-Mar. | 1952 season 10-30 days sometime between Mar. 1 and April 15- Depending on part of state | Limited-Nuisance beaver control |
| Michigan | Yes Locally | 1. State Trappers for nuisance beaver. 2. General open season-Late Mar. early April with bag limit. | Since 1931 Annual state-wide open seasons except where necessary to permit increase | Yes-nuisance beaver |

Table 13. Summary of Returns from the Beaver Questionnaire

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Notations on Beaver Laws, Harvests, etc., in Various States

Five states reported changing their beaver laws in 1951, three of these states declared an open season for the first time in recent history. They were Oregon, Kansas and South Dakota. One state, California, allowed the taking of beaver any time of the year, and any where within certain specified agricultural areas. Colorado this year allowed the taking of beaver by land owner permits - previously beaver were only taken by state trappers.

Below is a summary of the methods of harvests in the various states.

| Trappers Only | Combination of State Trappers & Permit System | Open Seasons | Dates | Open Seasons & landowner Permits | Dates | Permit System |
|---------------|---|-------------------------|-----------------------------|----------------------------------|-----------|---------------|
| Nevada | New Mexico | California ¹ | — | S. Dakota ² | Jan.-Feb. | Nebraska |
| Washington | Colorado | Oregon | Nov.15- Jan.15 | Minnesota | | Missouri |
| Arizona | Wyoming | Iowa | Nov.10- Jan.10 | New York | Feb.-Mar. | N. Dak. |
| | Idaho | Wisconsin | Feb.15- Mar.30 | | | |
| | Utah | Kansas | Dec.1- Jan.31 | | | |
| | | Pennsylvania | Feb.15- Mar.1 | | | |
| | | Michigan | Late March & early April | | | |

1. Has no general open season but has no closed season in certain agricultural areas.
2. Also has some beaver taken by state trappers, as do several other states incidental to their nuisance beaver work.

Table 14. Method of Beaver Harvest Employed by Various States.

Only one of the ten western states heard from harvested beaver by general open season. Of the eleven mid-west and eastern states contacted, eight had open seasons or combination open seasons and permits.

Most states reported a liberalization of laws in recent years, apparently aimed at attempts to increase harvests and/or encouraging the private trapper or landowner in the taking of beaver.

Three states mentioned that all pelts are sold through the department at auctions.

Nearly all states do some live-trapping of nuisance beaver. In most states in recent years this has been largely for damage control rather than to obtain stock for transplanting.

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Several mid-western states that formerly had few if any beaver, mention population build-ups from a small nucleus through closed seasons and transplanting - to where they had beaver trouble within a very few years (i.e. Iowa, Missouri).

Five states allow landowners to kill or remove beaver at any time of the year from certain agricultural areas (largely irrigation land).

Additional Pertinent Comments

- Wisconsin: Feels general open season would reduce North Dakota beaver population, but only if beaver pelts become more valuable.
It takes 7 days for the average trapper to take one beaver under the ice. In order to reduce a normal beaver population 33%-50% of beaver must be taken each year.
Trying to maintain a trappable population in agricultural areas will always bring complaints.
- Michigan: States that weather greatly influences the beaver take and consequently populations build-up following years of poor trapping conditions and conversely good trapping weather will bring about heavy takes. This can be somewhat compensated for, by liberalizing or restricting regulations the following year.

MANAGEMENT

Harvest Systems

From the previous section (Beaver Questionnaire), it can be seen that North Dakota is not alone in having trouble with beaver. When five of 20 states contacted have changed their beaver laws within the past year, one must concede that a considerable change has taken place in the concept of what constitutes good beaver management. It seems significant that all these changes have been toward a liberalization of beaver laws. Either to increase the beaver harvest, alleviate damage complaints or both.

If North Dakota were to attempt a new method of beaver harvest, what courses might be open to it? In Table 14, summarizing the methods of beaver harvest by various states, are represented the types of harvests employed by 21 states with beaver population, including North Dakota. The three basic methods of harvests are:

1. Use of state trappers.
2. Open seasons.
3. Permit system.

In addition, combinations of state trappers and permits and open season and permits are used by several states.

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The state trapper system is used solely in the west. There seems to have been considerable abandonment of this method of harvest. Wire and Hatch (6) found nine years ago that only five of the thirteen western states allowed the landowner or his agent to take beaver and eight of the thirteen states gave the landowner no percentage of the money received for pelts. Since then laws have been changed so that now nine of the twelve western states heard from allow landowner trapping in one form or another and only two states give no percentage of state-trapped pelts to the landowner. In addition, two western states have abandoned the state trapper method for general open seasons or no closed seasons in agricultural areas.

Open seasons are declared in ten of the twenty states contacted. Ashbrook (1) lists six other eastern and southern states with beaver populations that also declare open seasons. As noted earlier, three of the states with open seasons in 1951-1952 were declaring them for the first time that year.

The permit system was used in only three states contacted. Ashbrook (1) lists an additional state using a permit system. However, the permit system is used by eight of the states contacted in conjunction with state trapper or open season systems. Mainly this is just an additional means of harvest if the landowner wished to do his own trapping (in state-trapper states) or for out of season nuisance beaver in "open season" states.

Which of the above methods of harvest would be best for North Dakota? In developing a plan of harvest for any species there are three basic quantities which must be ascertained.

1. What is the population of the species?
2. What percent of the total population can be harvested annually without depleting the species?
3. Under an ideal type of harvest, one would be able to calculate the desired annual harvest from 1 and 2 above.

We have only a rough idea of (1) above but with more work on beaver populations a fair estimate could be made. In considering (2) above, Bradt (2) states that a 25% harvest would allow a steady increase and a 33 1/3% harvest should maintain a population. Wisconsin comments in the beaver questionnaire that a harvest between 33%-50% is necessary to reduce beaver populations. Theoretically then, under the present beaver permit system, which is an ideal set-up for controlled harvest, we should be able to pick the harvest we desired and issue permits accordingly and thus manipulate the harvest as we wished in order to deplete, augment, or maintain our total population.

With most species it is usually man, together with the factors of climate, food, predation, and disease that upset our theories. The beaver, unlike most species which are greatly influenced by the above factors, has little to fear from natural enemies, is not greatly influenced by climate and only rarely by disease. The only major checks to its population increases are man and over-utilization of his food supply. What then has brought about the failure of the permit system to keep beaver numbers under control? In this case the answer seems to be quite simple. It is largely due to man and his economics. The

The first part of the report deals with the general situation of the country and the results of the survey. It is followed by a detailed description of the various types of vegetation found in the different regions. The third part of the report contains a list of the plants and animals observed during the survey. The fourth part of the report contains a list of the places visited during the survey. The fifth part of the report contains a list of the people met during the survey. The sixth part of the report contains a list of the things seen during the survey. The seventh part of the report contains a list of the things heard during the survey. The eighth part of the report contains a list of the things felt during the survey. The ninth part of the report contains a list of the things smelled during the survey. The tenth part of the report contains a list of the things tasted during the survey.

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price of beaver pelts has been going down in an era when not only the value of the dollar return on pelts has shrunk but also landowners have been receiving more for their farm goods and wages have been going higher. Under these conditions the monetary return from beaver pelts has become less and less commensurate with the amount of work involved in obtaining them.

Would any other system of management increase the harvest under this adverse economic situation? It can be seen from Figure 4 that the total harvest has increased in the last three years even though the average price received per pelt has gone down. Except for the early years of the war this is the only major divergence there has been between the curves of average price and harvest. What is the cause? As was pointed out earlier the only reasonable explanation for this anomaly seems to be that it has been brought about by a harvest of beaver largely to remove them as nuisances rather than because of their pelt value. Since this increase in harvest has come about under the permit system, in spite of low prices, what might be the effect of an open season upon harvest? If there previously had been trappers who would have taken beaver, except for the extra effort involved in getting a permit - then it should increase the harvest to that extent. It does not seem logical that the landowners status would be greatly affected, for he always has been able to get permits upon complaint of damage. However, there have been some landowners in the state who did not know permits were so readily available, who may have taken beaver in a general open season.

What have been the experiences of other states who have recently opened seasons on beaver? Oregon recently changed from a state-trapper type of harvest to an open season. They increased their kill from 6,000 to 15,000 by this method but still did not reach the desired harvest. Trappers were allowed ten traps and 200 tags. Seals were \$2.00 each. There was some opposition to this because the low price paid for kits did not much exceed the cost of the tag. Iowa had a one week season in 1949. In 1950-1951 there was a two month state-wide season. They state that due to insufficient knowledge of how to trap beaver, the lack of time by farmers during the trapping season and the decline of beaver fur in 1951 we still have a beaver population that is too high to be compatible with good land use in Iowa. Kansas tried an open season last year (2 months) and hopes that the take will cut down numbers and allow a closed season for a few years. Wisconsin feels that an open season may increase the harvest but only if pelts become more valuable. Trappers contacted in North Dakota are largely of the opinion that an open season will not greatly increase the harvest. The consensus of opinion seems to be that an open season would increase the harvest but not to any great extent. No one voiced the danger of an over-harvest, unless prices should go up quite high.

What would be some of the advantages and disadvantages of an open season? One of the main advantages would be that it would be cheaper to administer than the present system. Under the permit system, any revenues that might be taken in are largely off-set by the costs of the wardens making inspections. At 7½¢ per mile it can readily be seen that a warden does not have to travel very far to use up the license money from one permit; this is especially true in areas where beaver permits are quite scattered. In areas where beaver permits are quite concentrated, as in the northeastern section of the state, costs of beaver inspections may be considerably less than returns from license and tag sales. Such was the case in 1951-1952 because of the large number of permits and the high kill in that corner of the state. The table below shows the department's revenue and the warden costs for several areas of the state.

Warden costs are based upon expenses listed in their daily reports while making beaver inspections and time spent making inspections at \$10 a day. In cases where other work was carried on the same day, time spent making inspections was listed as one-half day.

| Warden Area | No. of Permits | No. of Beaver | Dept. Revenue | Warden Costs |
|-------------|----------------|---------------|---------------|--------------|
| Bry | 118 | 486 | \$ 475.50 | \$ 275.60 |
| Decker | 76 | 292 | 301.00 | 325.90 |
| McKirdy | 67 | 191 | 246.25 | 237.53 |
| Pfeifer | 17 | 37 | 60.25 | 114.20 |
| Williams | 31 | 70 | 110.50 | 286.48 |
| Totals | 309 | 1,066 | \$1,193.50 | \$1,239.71 |

Table 15. Costs of Making Warden Inspections Compared to Revenue Received 1951-1952.

If the above figures are representative of the state as a whole, it can readily be seen that not only are department beaver revenues more than used up by the costs of making inspections, but that at the present beaver prices the cost of administering beaver under the permit system is at least 10% of the trappers return on pelts. This is based only on costs of inspecting permits and does not even consider money spent through the rest of the year on beaver nuisance problems.

Two additional comments are appropriate in considering costs of warden inspections:

1. In many cases travel costs may be too high since only a part of the costs were used for beaver inspections, as other business was also taken care of on days that inspections were made.

2. Costs would probably be higher but for the fact that wardens, knowing their areas, would know beaver conditions for some of these permits from previous contacts or nuisance trouble, and hence they would not have to make special trips for inspections.

Another advantage of an open season is that it would make it relatively simple to obtain a license to trap beaver. This should induce some to trap who didn't go to the bother of applying for a permit before. It would also eliminate much of the bookkeeping now necessary to care for the records of permits.

The main disadvantage of a general open season would be that there would be less chance for control of the harvest, by watershed or any other way, than there would be if permits were issued with given legal descriptions of where beaver could be taken. However, there still could be a fair control of harvest if watershed data could be continued. (See Section 5 - Open Season Considerations).

Open Season Considerations

If an open season should be declared for North Dakota, there are several ideas to consider in administering it. Below are several points with possible solutions outlined:

1. Time of Year: Returns from the beaver questionnaire show that the various states have seasons some time between November 1 and the middle of April. Those states with the warmer climates and more open water generally have seasons in the late fall or early winter. The more northern states have late winter or spring seasons. Several of these are early enough to necessitate under ice trapping. The Canadian provinces with open seasons also have spring seasons - Alberta's lasting until May 15. (Ashbrook (1)).

Since North Dakota's first concern is to increase the harvest, it can best do this by establishing a season at a time of year when the bulk of the trappers catch their beaver under the permit system. Checking dates of sealing shows that seals are issued through all the months from November to May. The majority of pelts are sealed in April and May. This does not necessarily indicate when the beaver have been caught as many are held for a considerable period before being tagged. It does, however, demonstrate that beaver are taken through six months of the year.

Due to winter travel problems, most of the pelts are taken in late fall and early spring trapping. Nearly all trappers contacted, trapped in one or the other or both of these periods. Most of them cease activity through the middle of the winter. One, however, had taken nearly his full quota from under-the-ice trapping in January and February. Others who were contacted in February had undertaken no trapping as yet but were waiting for the warmer weather of early spring to open up spots for trapping. Judging from trapper contacts then and the opinions of several of the wardens, the majority of beaver appear to be taken in the spring. Some of these are taken in the warm weather preceding the break-up. Others are taken during and following the break-up. Considerable numbers are also taken in fall.

It would seem that any setting of seasons should consider a spring season first. Not only because most beaver are harvested then but because skins are then at their best. If a fall season is considered, it should be late enough so that the bulk of the pelts are prime. Oregon states that in its November 10-January 10 season most pelts were already quite prime, although fur buyers used unprimeness as an excuse for low prices. In a recent fall season in Minnesota it was found that many of the pelts taken between November 1 and 14 were not prime and trappers did not receive good prices from such early-trapped pelts. Minnesota now considers April as the best time to have a season.

Considering the above conditions then, it would appear that the best time to set a season would be somewhere between December 1 and April 30. It is obvious that unless a five month season is set some of the trappers favorite trapping periods will be missed. Probably the least trapped period now lies between the first part of January and the first part of March. Thus the logical time for any season shorter than four to five months would be either before or after this period. This would call for a late fall and early winter season or a spring season, unless some sort of a compromise could be worked out. Either season might give a poor harvest if weather conditions were wrong. One possibility would be to proclaim a split season. Another would be to proclaim a fall season and then if the harvest was insufficient, grant an additional spring season.

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2. Landowner Considerations: An open season would not be too much to the landowners advantage except that it might enable him to more readily obtain trappers because then they would not have to get a separate license for all land they trapped on. This would not have any effect on the large numbers of landowners who do their own trapping. A glance back at Table 11 shows that over 1/3 of the landowners do their own trapping and approximately 1/2 are trapped by landowners or their relatives (largely landowners sons). Due to the lack of control of this type of harvest as compared to a permit system, there would perhaps be a tendency toward the "sneak-in" trapper or possibly undue competition between trappers. Since most of North Dakota's beaver are on private lands this might not be the problem it has become in other states, especially on public lands. Presumably this situation could be avoided by making it mandatory for the trapper to carry a notice of written permission to trap from the landowner. In this way a landowner with a large acreage could allow several trappers on his land. He could also more easily prevent trapping of beaver if he did not wish them to be removed.

3. Prices of Licenses and Tags: Another possible change would be to make the department's revenue from each trapper more dependent upon the number of pelts he took. The best way to do this would be to lower the price of the beaver license and raise the price of the tag. This would make it cheaper for the little fellow who only gets a few beaver and would bring in more returns from the professional trapper who buys only one beaver license for all lands trapped, but gets a large number of beaver. Some possible schedules are listed below. It can be seen that in all cases it is cheaper for the "little" trapper and more expensive for the trappers getting larger numbers of beaver.

| No. of Beaver | Present System | Tags \$.50 | Tags \$.50 | Tags \$.75 |
|------------------|-------------------|---------------|---------------|---------------|
| License | \$3.00 | \$1.50 | \$2.00 | \$1.00 |
| 1 | 3.25 | 2.00 | 2.50 | 1.75 |
| 2 | 3.50 | 2.50 | 3.00 | 2.50 |
| 3 | 3.75 | 3.00 | 3.50 | 3.25 |
| 4 | 4.00 | 3.50 | 4.00 | 4.00 |
| 5 | 4.25 | 4.00 | 4.50 | 4.75 |
| 6 | 4.50 | 4.50 | 5.00 | 5.50 |
| 8 | 5.00 | 5.50 | 6.00 | 7.00 |
| 12 | 6.00 | 7.50 | 8.00 | 10.00 |
| 16 | 7.00 | 9.50 | 10.00 | 13.00 |

4. Bag Limit: Several states with open seasons have imposed bag limits. Limits vary from two in Pennsylvania, (which treats beaver more or less as a game animal allowing anybody with a hunting license to take beaver) to a high of 200 in Oregon. The latter state was attempting to get as large a harvest as possible in order to reduce its population. Other states which establish

bag limits have limits between six and fifteen beaver. An open season in North Dakota should tend to encourage all trappers. A bag limit - or at least a low one - would tend to defeat the states purpose of obtaining a large kill by discouraging the professional trappers. Hence in the event of an open season on beaver it seems desirable not to place too low a bag limit if one is established.

5. Continuing Harvest by Watershed Data: In order to continue the present practice of calculating harvest by drainages and tributaries this data should be obtained if possible. This could best be done by the wardens at the time pelts are presented for sealing. The basic data necessary would be the name of the stream and the county taken in. If it were practical, data on township and range could also be obtained. This would locate harvests more exactly, especially in large counties.

6. Closed Areas: This system would not be likely to come into consideration in any early attempt at an open season since the main effort would be to cut down beaver populations throughout the state. If, however, beaver should become badly depleted in any areas where they would be welcome or at least be tolerated, a system of closed areas should soon furnish stock to surrounding areas. The reason for this is the beavers mobility and his propensity for restocking suitable habitat. Family colonies of beaver automatically kick out their young upon reaching maturity and these young animals some times move considerable distances before finding suitable areas. Michigan has used this technique to advantage in areas that have become trapped down. It is apparently quite effective.

State Trapper System

The alternative to opening a season on beaver would be to set up a state-trapper system. Its use in the western states has been discussed earlier. The very fact that several of the western states are turning away from this method seems to indicate that this would not be a good venture to try. However, it is apparently working successfully in several of these states at present. This method gives each trapper certain areas to trap in, usually with a given number of permits for beaver. It appears especially well adapted to harvests on public lands. On private lands, there is usually a percentage of the pelt given to the landowner. It has an advantage in that trouble spots could be thoroughly trapped by sending in men to pelt large areas around trouble spots instead of obtaining only spot removal at such areas. However, monetary returns in this method are divided among a relatively few trappers, except for the percentage given to landowners, and it appears to violate the principle of dividing a resource so as to "provide the greatest good for the greatest number."

In times of low prices, as at present, it also seems doubtful if returns from pelting operations, when divided among landowners and trappers, would be sufficient to support a state sponsored trapping program. The department would again be likely to lose money on the beaver resource as it has done on the permit system. Although if beaver pelts were bringing fair prices and trappers were easily obtainable this system might work quite well.

Open Season - Permit System

Several states use a combination permit system and open season. This is another possibility which could be used if it became apparent that an open season was cutting down populations too low in certain areas. An open season

could be declared for part of the state and the permit system retained where it was deemed necessary to hold down the harvest. South Dakota tried this technique in 1951. An open season was declared in a few counties adjacent to the Big Missouri and the permit system was retained in other areas.

Economic Status

The type of damage that the beaver does have been discussed earlier but little has been said about the good it may do. In certain areas the benefits derived from his damming activities out weigh his tree-cutting characteristics. This is largely because the beaver provides a constant water supply for stock, although some benefit to lowland hay growth undoubtedly occurs from the raising of the water level by dams. Beaver also may benefit fish life. In this state, there are no beaver-trout relationships but the author did see one area where the presence of a beaver dam was helping to maintain enough water to support Northern Pike. The water was four feet deep above the dam and barely six inches deep below it.

As a general rule, the degree of tolerance of beaver activity - and therefore the amount of benefit - is largely dependent upon the number of trees in the area. In the western part of the state where trees are valued quite highly a considerable amount of damage can be done in a short time although where there is no bad flooding he is at times tolerated because of his water-conserving characteristics. This also holds true for the eastern part of the state, but here tree-cutting may not always be the worst offense, especially in wooded areas like the Turtle Mountains, for considerable damage is also sustained from flooding.

In considering how high beaver populations should be maintained in the state one should consider the fact that there will probably always be beaver damages and complaints in agricultural areas. It was noted that in the beaver questionnaire several states made comments on the feasibility of retaining beaver populations in farm areas. Minnesota states that it has been trying to keep beaver within reasonable numbers but not cut them down too far....but it has not been able to keep ahead of reproduction. We believe that beaver have little or no place in agricultural areas. Wisconsin comments that trying to maintain a trapable population in agriculture areas will always bring complaints. Possibly a final question to consider as to the advisability of maintaining beaver in farm areas would be: Does the beaver's pelt value and its value as a conservator of water, justify maintaining populations in areas where there is conflict with farm interests?

Since we do now have beaver in considerable numbers in farm areas it seems reasonable to assume that there should be greater flexibility in the beaver laws to enable farmers to quickly take care of beaver damage problems, especially in irrigated areas, without waiting for the state to take care of the problem. As was brought out earlier, five states do have such laws. California allows the killing of beaver by anyone, any where, any time of the year in certain irrigated areas. Colorado last year passed a law allowing the killing of beaver in irrigated areas. In other areas, if a game officer didn't appear in 24 hours following notification, the landowner could kill the beaver himself and deliver the pelt to the state. Missouri and New York issue some permits to trap beaver at any time of the year in nuisance areas. Nebraska also issues special permits for irrigation districts. North Dakota has somewhat similar beaver problems. It too should see the necessity for quick removal of beaver by any means in certain areas and adjust its laws accordingly.

Summary

1. Following a period of early abundance in early trapping years, beaver numbers declined to a low point around the turn of the last century. Since this time there has been an increase in numbers through a period of open and closed seasons. Since 1931 a permit system of harvest has been in effect.
2. During the last 13 years beaver harvests have run between 1100 and 2500, with declines and increases generally brought on by price fluctuations. A marked exception to this has occurred the last three years when the number of permits sold and the harvest have gone up in spite of low prices.
3. Several areas have had marked increases in harvest and populations during the last 10 years - notably the Turtle Mts., Sheyenne River and several rivers in the north-eastern section of the state.
4. Trapper income from beaver for the past 12 years has run between \$18,000 and \$74,000. During this period the state grossed \$17,860 from permit and license sales. Approximately \$6,850 more was taken in from all state-trapped pelts.
5. During the last six years the percentage of successful trappers on permits has run between 58 and 33 percent.
6. Indications are that at the most only one-half to one-third of the total colonies in the state are trapped each year.
7. Comparing aerial census figures with harvest indicate that from 7.5 - 12% of the population was taken on portions of streams sampled in 1951 - 1952.
8. Beaver take per mile of stream was approximately .1 beaver per mile on all streams censused in 1951 and on the Mouse and Maple Rivers in 1949. More concentrated trapping efforts produced a take of .5 beaver per mile and 1.2 beaver per mile respectively on the Forest and Sheyenne Rivers in 1949. The nine year average for the portion of Apple Creek trapped was .3 beaver per mile.
9. It is roughly estimated that there are somewhere around 4,000 colonies of beaver in the state.
10. Five hundred and seventy-four beaver were live-trapped by the state trapper, 96 of these were tagged, of which we have returns on five. The longest movement was 28 stream miles. Cost per live-trapped beaver is conservatively estimated at \$26.13 per beaver.
11. Tree-cutting has been the main damage reported on inspection reports with flooding and crop damage as of secondary importance and miscellaneous items as ditch-plugging and undermining etc. also contributing to the list.

12. Three basic types of harvest were used by the various states contacted. The state-trapper system, permit system and open seasons. Open seasons are commonly used by the eastern states and state-trapper systems by the western states. Combination of all three systems occur.

13. Nearly all states contacted live-trapped for nuisance beaver control.

14. Five states recently changed their beaver laws. Three of these declared open seasons.

15. An open season would have a distinct advantage over a permit system in being less costly to administer. It would also relieve the wardens from the necessity of making inspections and give them more time for fall patrol work.

16. Several points to consider in any establishment of an open season would be: Time of year, landowner considerations, price of licenses and tag, bag limits and continuing harvest-by-watershed data.

17. Consideration should be given as to the numbers of beaver that it is desirable to maintain, if any, in intensively farmed areas and the population cut down accordingly, if possible. It is felt that there should also be a change in beaver laws so that beaver could be quickly and legally removed in special areas, such as irrigation districts.

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THE HISTORY OF

THE CITY OF NEW YORK, FROM THE FIRST SETTLEMENT, TO THE PRESENT TIME.

BY J. C. CALVERT, ESQ.

IN TWO VOLUMES.

LONDON: Printed by J. JOHNSON, in Pall-mall.

1796.

Printed by J. JOHNSON, in Pall-mall.

APPENDIX

Beaver Questionnaire Form

1. Do you have beaver in harvestable numbers in your state? _____

2. Does your state have a beaver problem? _____

3. How are beaver harvested?

a. State trappers (any percent to landowners)? _____

b. Permit system (how carried out)? _____

c. Open season (usual time of year)? _____

d. Others _____

e. Remarks _____

4. What have been the policies behind recent (last 20-30 years) legislative acts concerning beaver harvest in your state? If any acts were different from present law, give, if possible, the type of harvest authorized by law.

5. Do you now have a live-trapping program? If so, is this mainly for transplanting purposes or for nuisance beaver control?

THE HISTORY OF THE UNITED STATES

The history of the United States is a story of growth, struggle, and achievement. From the first European settlers to the present day, the nation has faced countless challenges and overcome them through the courage and ingenuity of its people. The story begins with the Pilgrims in 1620, who sought a new life in a new land. They were followed by other settlers, and the colonies grew in number and size. The American Revolution was a turning point in the nation's history, as the colonies declared their independence from Great Britain. The new nation was born, and it set out on a path of growth and development. The American Civil War was another major event in the nation's history, as the Union fought to preserve itself and to end slavery. The war ended in 1865, and the nation began to rebuild itself. The Reconstruction era was a time of great change and struggle, as the South was brought back into the Union and the rights of African Americans were fought for. The Gilded Age was a time of great wealth and power, as the industrial revolution transformed the nation. The Progressive Era was a time of reform and change, as the government began to regulate the economy and protect the rights of workers. The American Revolution was a turning point in the nation's history, as the colonies declared their independence from Great Britain. The new nation was born, and it set out on a path of growth and development. The American Civil War was another major event in the nation's history, as the Union fought to preserve itself and to end slavery. The war ended in 1865, and the nation began to rebuild itself. The Reconstruction era was a time of great change and struggle, as the South was brought back into the Union and the rights of African Americans were fought for. The Gilded Age was a time of great wealth and power, as the industrial revolution transformed the nation. The Progressive Era was a time of reform and change, as the government began to regulate the economy and protect the rights of workers. The American Revolution was a turning point in the nation's history, as the colonies declared their independence from Great Britain. The new nation was born, and it set out on a path of growth and development. The American Civil War was another major event in the nation's history, as the Union fought to preserve itself and to end slavery. The war ended in 1865, and the nation began to rebuild itself. The Reconstruction era was a time of great change and struggle, as the South was brought back into the Union and the rights of African Americans were fought for. The Gilded Age was a time of great wealth and power, as the industrial revolution transformed the nation. The Progressive Era was a time of reform and change, as the government began to regulate the economy and protect the rights of workers.

1939 - 1940

1940 - 1941

| Name of River | No. of permits | Total beaver allowed | Average No. beaver taken per permit | Actual take | % of allowed taken | No. of permits | Total beaver allowed | Average No. beaver taken per permit | Actual take | % of allowed taken |
|-------------------------|----------------|----------------------|-------------------------------------|-------------|--------------------|----------------|----------------------|-------------------------------------|-------------|--------------------|
| Heart River | 67 | 880 | 6.0 | 404 | 46 | 74 | 709 | 4.4 | 329 | 46 |
| Knife River | 46 | 400 | 6.7 | 310 | 44 | 39 | 406 | 5.3 | 206 | 51 |
| Cannonball River | 42 | 446 | 3.3 | 140 | 31 | 45 | 429 | 3.6 | 160 | 37 |
| Little Missouri River | 45 | 550 | 6.8 | 306 | 56 | 49 | 492 | 5.5 | 270 | 55 |
| Yellowstone River | 5 | 65 | 5.2 | 26 | 40 | 3 | 34 | 5.3 | 16 | 47 |
| Grand River | 0 | 0 | 0.0 | 0 | 0 | 1 | 5 | 5.0 | 5 | 0 |
| Big Missouri River | 45 | 561 | 4.6 | 209 | 37 | 61 | 640 | 6.1 | 372 | 58 |
| Pembina River | 8 | 92 | 6.9 | 55 | 60 | 4 | 45 | 5.3 | 21 | 47 |
| Tongue River | 4 | 48 | 7.5 | 30 | 63 | 2 | 23 | 1.0 | 2 | 9 |
| Park River | 1 | 10 | 9.0 | 4 | 40 | 1 | 5 | 1.0 | 1 | 20 |
| Forest River | 2 | 35 | 2.5 | 5 | 14 | 4 | 42 | 1.8 | 7 | 17 |
| Turtle River | 0 | 0 | 0.0 | 0 | - | 0 | 0 | 0.0 | 0 | - |
| Goose River | 0 | 0 | 0.0 | 0 | - | 0 | 0 | 0.0 | 0 | - |
| Sheyenne River | 2 | 18 | 1.5 | 3 | 17 | 0 | 0 | 0.0 | 0 | - |
| Red River | 0 | 0 | 0.0 | 0 | - | 0 | 0 | 0.0 | 0 | - |
| James River | 3 | 45 | 5.7 | 17 | 38 | 3 | 33 | 6.7 | 20 | 61 |
| Mouse River | 22 | 200 | 4.3 | 95 | 48 | 24 | 227 | 5.7 | 136 | 60 |
| Turtle Mts. | 0 | 0 | 0.0 | 0 | - | 0 | 0 | 0.0 | 0 | - |
| Misc. | 0 | 0 | 0.0 | 0 | - | 0 | 0 | 0.0 | 0 | - |
| Indians (Fort Berthold) | - | - | - | 280 | - | - | - | - | 456 | - |
| Indians (Standing Rock) | - | - | - | 28 | - | - | - | - | 68 | - |
| Game & Fish Department | - | - | - | 9 | - | - | - | - | 7 | - |
| U.S. Wildlife Refuges | - | - | - | - | - | - | - | - | - | - |
| Totals | 292 | 3650 | 5.5 | 1921 | 44 | 310 | 3090 | 5.0 | 2076 | 50 |

Table A - Twelve Year Analysis, by Watershed, of Beaver Permits and Harvest.

1941 - 1942

1942 - 1943

| Name of River | No. of permits | Total beaver allowed | Average No. beaver taken per permit | Actual take | % of allowed taken | No. of permits | Total beaver allowed | Average No. beaver taken per permit | Actual take | % of allowed taken |
|-------------------------|----------------|----------------------|-------------------------------------|-------------|--------------------|----------------|----------------------|-------------------------------------|-------------|--------------------|
| Heart River | 55 | 283 | 3.4 | 186 | 66 | 40 | 318 | 2.7 | 109 | 34 |
| Knife River | 46 | 277 | 3.5 | 160 | 58 | 40 | 328 | 4.2 | 166 | 51 |
| Cannonball River | 36 | 207 | 3.1 | 112 | 54 | 31 | 290 | 2.0 | 62 | 21 |
| Little Missouri River | 34 | 236 | 5.4 | 184 | 78 | 34 | 300 | 3.3 | 111 | 37 |
| Yellowstone River | 3 | 29 | 4.0 | 12 | 41 | 3 | 27 | 3.0 | 9 | 33 |
| Grand River | 0 | 0 | 0.0 | 0 | 0 | 1 | 20 | 16.0 | 16 | 75 |
| Big Missouri River | 40 | 258 | 3.1 | 125 | 48 | 31 | 258 | 3.5 | 108 | 42 |
| Pembina River | 10 | 84 | 5.9 | 59 | 70 | 1 | 10 | 2.0 | 2 | 20 |
| Tongue River | 9 | 94 | 4.9 | 44 | 47 | 7 | 49 | 3.4 | 24 | 49 |
| Park River | 0 | 0 | 0.0 | 0 | - | 4 | 24 | 1.8 | 7 | 29 |
| Forest River | 12 | 97 | 2.7 | 32 | 33 | 8 | 43 | 3.4 | 27 | 63 |
| Turtle River | 0 | 0 | 0.0 | 0 | - | 1 | 10 | 0.0 | 0 | 0 |
| Goose River | 0 | 0 | 0.0 | 0 | - | 1 | 8 | 8.0 | 8 | 100 |
| Shenenne River | 2 | 16 | 4.0 | 8 | 50 | 15 | 119 | 3.6 | 54 | 45 |
| Red River | 0 | 0 | 0.0 | 0 | - | 2 | 14 | 6.0 | 12 | 86 |
| James River | 3 | 19 | 3.0 | 9 | 47 | 1 | 15 | 5.0 | 5 | 33 |
| Mouse River | 28 | 240 | 3.7 | 103 | 43 | 35 | 278 | 4.8 | 169 | 61 |
| Turtle Mts. | 0 | 0 | 0.0 | 0 | - | 0 | 0 | 0.0 | 0 | - |
| Misc. | 0 | 0 | 0.0 | 0 | - | 3 | 5 | 1.7 | 5 | 100 |
| Indians (Fort Berthold) | - | - | - | 115 | - | - | - | - | 97 | - |
| Indians (Standing Rock) | - | - | - | 105 | - | - | - | - | 62 | - |
| Game & Fish Department | - | - | - | 15 | - | - | - | - | 36 | - |
| U.S. Wildlife Refuges | - | - | - | 122 | - | - | - | - | 34 | - |
| Totals | 278 | 1840 | 3.7 | 1391 | 56 | 258 | 2116 | 3.5 | 1123 | 42 |

1943 - 1944

1944 - 1945

| Name of River | No. of permits | Total beaver allowed | Average No. beaver taken per permit | Actual take | % of allowed taken | No. of permits | Total beaver allowed | Average No. beaver taken per permit | Actual take | % of allowed taken |
|-------------------------|----------------|----------------------|-------------------------------------|-------------|--------------------|----------------|----------------------|-------------------------------------|-------------|--------------------|
| Heart River | 53 | 395 | 3.6 | 192 | 49 | 29 | 216 | 4.2 | 122 | 56 |
| Knife River | 30 | 237 | 4.7 | 139 | 59 | 24 | 143 | 3.6 | 86 | 60 |
| Cannonball River | 32 | 286 | 3.1 | 99 | 35 | 30 | 245 | 2.7 | 82 | 33 |
| Little Missouri River | 26 | 261 | 3.8 | 99 | 38 | 20 | 228 | 4.3 | 86 | 38 |
| Yellowstone River | 5 | 54 | 4.0 | 20 | 37 | 4 | 31 | 4.0 | 16 | 52 |
| Grand River | 1 | 7 | 7.0 | 7 | 100 | 2 | 16 | 1.5 | 3 | 19 |
| Big Missouri River | 39 | 337 | 3.7 | 146 | 43 | 27 | 179 | 3.1 | 85 | 47 |
| Pembina River | 4 | 23 | 3.3 | 13 | 57 | 6 | 39 | 4.0 | 24 | 62 |
| Tongue River | 14 | 123 | 4.1 | 57 | 46 | 14 | 111 | 4.5 | 63 | 57 |
| Park River | 11 | 71 | 3.5 | 38 | 54 | 14 | 108 | 3.8 | 53 | 49 |
| Forest River | 20 | 152 | 3.3 | 66 | 43 | 29 | 228 | 3.3 | 97 | 43 |
| Turtle River | 1 | 10 | 0.0 | 0 | 0 | 1 | 10 | 8.0 | 8 | 80 |
| Goose River | 0 | 0 | 0.0 | 0 | - | 0 | 0 | 0.0 | 0 | - |
| Sheyenne River | 21 | 129 | 4.2 | 89 | 69 | 55 | 331 | 3.9 | 217 | 66 |
| Red River | 3 | 24 | 6.3 | 19 | 79 | 4 | 26 | 3.5 | 14 | 54 |
| James River | 11 | 70 | 2.5 | 27 | 39 | 13 | 93 | 1.4 | 18 | 19 |
| Mouse River | 46 | 416 | 5.1 | 235 | 56 | 32 | 298 | 4.1 | 132 | 44 |
| Turtle Mts. | 1 | 2 | 2.0 | 2 | 100 | 1 | 4 | 4.0 | 4 | 100 |
| Misc. | 3 | 20 | 3.3 | 10 | 50 | 8 | 0 | - | 0 | - |
| Indians (Fort Berthold) | - | - | - | 103 | - | - | - | - | 117 | - |
| Indians (Standing Rock) | - | - | - | 27 | - | - | - | - | 41 | - |
| Game & Fish Department | - | - | - | 31 | - | - | - | - | 59 | - |
| U.S. Wildlife Refuges | - | - | - | 146 | - | - | - | - | 258 | - |
| Totals | 321 | 2617 | 3.9 | 1565 | 48 | 313 | 2306 | 3.5 | 1585 | 48 |

1945 - 1946

1946 - 1947

| Name of River | No. of permits | Total beaver allowed | Average No. beaver taken per permit | Actual take | % of allowed taken | No. of permits | Total beaver allowed | Average No. beaver taken per permit | Actual take | % of allowed taken |
|-------------------------|----------------|----------------------|-------------------------------------|-------------|--------------------|----------------|----------------------|-------------------------------------|-------------|--------------------|
| Heart River | 55 | 419 | 4.4 | 242 | 58 | 50 | 357 | 2.4 | 120 | 34 |
| Knife River | 15 | 100 | 3.8 | 57 | 57 | 35 | 208 | 3.0 | 104 | 50 |
| Cannonball River | 38 | 336 | 4.1 | 155 | 46 | 62 | 461 | 2.0 | 125 | 27 |
| Little Missouri River | 28 | 226 | 4.1 | 115 | 51 | 22 | 242 | 5.4 | 119 | 49 |
| Yellowstone River | 3 | 29 | 7.7 | 23 | 79 | 6 | 65 | 6.5 | 39 | 60 |
| Grand River | 0 | 0 | 0.0 | 0 | - | 3 | 12 | 3.3 | 10 | 83 |
| Big Missouri River | 44 | 328 | 5.4 | 238 | 73 | 47 | 333 | 4.0 | 190 | 57 |
| Pembina River | 10 | 65 | 5.8 | 58 | 89 | 18 | 118 | 5.3 | 95 | 80 |
| Tongue River | 6 | 40 | 4.7 | 28 | 70 | 12 | 79 | 4.7 | 56 | 71 |
| Park River | 12 | 85 | 4.2 | 50 | 59 | 25 | 161 | 2.7 | 68 | 42 |
| Forest River | 24 | 152 | 4.7 | 113 | 74 | 31 | 192 | 4.1 | 127 | 66 |
| Turtle River | 3 | 22 | 4.0 | 12 | 55 | 1 | 6 | 4.0 | 4 | 66 |
| Goose River | 2 | 20 | 7.0 | 14 | 70 | 5 | 25 | 3.4 | 17 | 68 |
| Sheyenne River | 71 | 391 | 3.8 | 268 | 69 | 81 | 441 | 3.5 | 282 | 64 |
| Red River | 7 | 54 | 4.9 | 34 | 63 | 8 | 59 | 2.3 | 18 | 31 |
| James River | 9 | 46 | 2.0 | 18 | 39 | 12 | 49 | 2.5 | 29 | 59 |
| Mouse River | 24 | 171 | 3.4 | 82 | 48 | 39 | 291 | 4.4 | 170 | 58 |
| Turtle Mts. | 1 | 4 | 4.0 | 4 | 100 | 2 | 7 | 1.0 | 2 | 29 |
| Misc. | 1 | 5 | 0.0 | 0 | 0 | 3 | 16 | 4.0 | 12 | 75 |
| Indians (Fort Berthold) | - | - | - | 306 | - | - | - | - | 123 | - |
| Indians (Standing Rock) | - | - | - | 67 | - | - | - | - | 78 | - |
| Game & Fish Department | - | - | - | 39 | - | - | - | - | 32 | - |
| U.S. Wildlife Refuges | - | - | - | 124 | - | - | - | - | 65 | - |
| Totals | 353 | 2493 | 4.3 | 2059 | 61 | 465 | 3122 | 3.4 | 1885 | 51 |

1947 - 1948

1948 - 1949

| Name of River | No. of permits | Total beaver allowed | Average No. beaver taken per permit | Actual take | % of allowed taken | No. of permits | Total beaver allowed | Average No. beaver taken per permit | Actual take | % of allowed taken |
|-------------------------|----------------|----------------------|-------------------------------------|-------------|--------------------|----------------|----------------------|-------------------------------------|-------------|--------------------|
| Heart River | 41 | 317 | 3.2 | 130 | 41 | 26 | 217 | 2.6 | 58 | 26.7 |
| Knife River | 23 | 133 | 2.6 | 59 | 44 | 17 | 116 | 3.0 | 51 | 44.0 |
| Cannonball River | 43 | 405 | 4.3 | 183 | 45 | 47 | 460 | 2.0 | 104 | 22.6 |
| Little Missouri River | 18 | 174 | 4.5 | 81 | 47 | 23 | 243 | 3.0 | 68 | 28.0 |
| Yellowstone River | 3 | 35 | 10.3 | 31 | 89 | 2 | 14 | .5 | 1 | 7.1 |
| Grand River | 3 | 16 | 2.0 | 6 | 37 | 2 | 18 | 5.5 | 11 | 61.1 |
| Big Missouri River | 36 | 261 | 3.1 | 113 | 43 | 57 | 415 | 2.7 | 153 | 36.9 |
| Pembina River | 10 | 61 | 3.0 | 30 | 49 | 10 | 68 | 4.0 | 40 | 58.8 |
| Tongue River | 7 | 48 | 2.3 | 16 | 33 | 5 | 33 | 3.0 | 15 | 45.4 |
| Park River | 17 | 124 | 2.2 | 38 | 31 | 20 | 123 | 2.6 | 52 | 42.3 |
| Forest River | 23 | 151 | 1.9 | 43 | 28 | 22 | 141 | 1.4 | 31 | 22.0 |
| Turtle River | 2 | 15 | 3.0 | 6 | 40 | 4 | 35 | 1.3 | 5 | 14.3 |
| Goose River | 1 | 5 | 1.0 | 1 | 20 | 5 | 23 | 2.4 | 12 | 52.2 |
| Sheyenne River | 52 | 271 | 2.4 | 124 | 46 | 79 | 502 | 3.6 | 282 | 56.2 |
| Red River | 3 | 24 | 2.7 | 8 | 33 | 12 | 57 | 2.0 | 24 | 42.1 |
| James River | 4 | 13 | | 0 | - | 17 | 95 | 2.5 | 43 | 45.3 |
| Mouse River | 18 | 112 | 3.7 | 66 | 59 | 20 | 120 | 2.9 | 58 | 48.3 |
| Turtle Mts. | 2 | 10 | 4.0 | 8 | 80 | - | | - | - | - |
| Misc. | 5 | 10 | .4 | 2 | 20 | 2 | | 2.0 | 4 | - |
| Indians (Fort Berthold) | - | - | | 137 | - | - | | | 93 | - |
| Indians (Standing Rock) | - | - | | 86 | - | - | | | 56 | - |
| Game & Fish Department | - | - | | 32 | - | - | | | 11 | - |
| U.S. Wildlife Refuges | - | - | | 0 | - | - | | | - | - |
| Totals | 311 | 2185 | 3.0 | 1200 | 43 | 370 | 2680 | 2.7 | 1172 | 37.8 |

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| 3 | DECLASSIFICATION |
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| 91 | EXEMPTION |
| 92 | EXEMPTION |
| 93 | EXEMPTION |
| 94 | EXEMPTION |
| 95 | EXEMPTION |
| 96 | EXEMPTION |
| 97 | EXEMPTION |
| 98 | EXEMPTION |
| 99 | EXEMPTION |
| 100 | EXEMPTION |

1949 - 1950

1950 - 1951

| Name of River | No. of permits | Total beaver allowed | Average No. beaver taken per permit | Actual take | % of allowed taken | No. of permits | Total beaver allowed | Average No. beaver taken per permit | Actual take | % of allowed taken |
|-------------------------|----------------|----------------------|-------------------------------------|-------------|--------------------|----------------|----------------------|-------------------------------------|-------------|--------------------|
| Heart River | 46 | 481 | 3.0 | 140 | 29.2 | 46 | 442 | 3.0 | 137 | 31.0 |
| Knife River | 42 | 329 | 2.3 | 97 | 29.5 | 30 | 258 | 2.6 | 79 | 30.6 |
| Cannonball River | 59 | 680 | 2.6 | 152 | 22.3 | 48 | 529 | 3.3 | 160 | 30.2 |
| Little Missouri River | 32 | 376 | 3.4 | 110 | 29.2 | 33 | 486 | 7.0 | 230 | 47.3 |
| Yellowstone River | 6 | 69 | 7.0 | 42 | 60.8 | 4 | 95 | 11.5 | 46 | 48.4 |
| Grand River | - | - | - | - | - | 7 | 68 | 2.3 | 3 | 4.4 |
| Big Missouri River | 69 | 683 | 3.0 | 205 | 30.0 | 93 | 1120 | 3.4 | 313 | 27.9 |
| Pembina River | 9 | 79 | 2.0 | 18 | 22.8 | 3 | 35 | 6.3 | 19 | 54.3 |
| Tongue River | 5 | 54 | 1.6 | 8 | 14.8 | 6 | 58 | 4.3 | 26 | 44.8 |
| Park River | 40 | 342 | 1.7 | 68 | 20.0 | 33 | 348 | 3.6 | 118 | 33.9 |
| Forest River | 15 | 154 | 2.2 | 33 | 21.4 | 17 | 150 | 1.6 | 28 | 18.7 |
| Turtle River | 12 | 102 | 2.8 | 33 | 32.3 | 9 | 72 | 2.0 | 18 | 25.0 |
| Goose River | 9 | 70 | 2.9 | 26 | 37.1 | 18 | 154 | 2.7 | 49 | 31.8 |
| Shenenne River | 102 | 747 | 3.4 | 345 | 46.2 | 93 | 674 | 3.3 | 307 | 45.5 |
| Red River | 12 | 95 | 2.6 | 31 | 30.6 | 14 | 108 | 2.6 | 37 | 34.2 |
| James River | 12 | 101 | 2.3 | 27 | 26.7 | 21 | 164 | 1.6 | 33 | 20.1 |
| Mouse River | 23 | 261 | 4.0 | 92 | 35.2 | 44 | 548 | 4.1 | 182 | 33.2 |
| Turtle Mts. | 15 | 116 | 2.3 | 34 | 29.3 | 23 | 240 | 4.6 | 107 | 44.6 |
| Mauvais Coulee | 1 | 10 | 8.0 | 8 | 80.0 | 3 | 20 | 1.0 | 3 | |
| Misc. | 4 | 23 | | 0 | | 6 | 43 | | 15 | |
| Indians (Fort Berthold) | - | 75 | | 75 | | - | | | 146 | |
| Indians (Standing Rock) | - | 63 | | 63 | | - | | | 23 | |
| Game & Fish Department | - | 17 | | 17 | | - | | | 23 | |
| U.S. Wildlife Refuges | - | 32 | | 32 | | - | | | 23 | |
| Totals | 513 | 4772 | 2.9 | 1656 | 30.8 | 551 | 5612 | 3.5 | 2102 | 34.0 |

| | |
|----|------------|
| 1 | 1951年1月1日 |
| 2 | 1951年1月2日 |
| 3 | 1951年1月3日 |
| 4 | 1951年1月4日 |
| 5 | 1951年1月5日 |
| 6 | 1951年1月6日 |
| 7 | 1951年1月7日 |
| 8 | 1951年1月8日 |
| 9 | 1951年1月9日 |
| 10 | 1951年1月10日 |
| 11 | 1951年1月11日 |
| 12 | 1951年1月12日 |
| 13 | 1951年1月13日 |
| 14 | 1951年1月14日 |
| 15 | 1951年1月15日 |
| 16 | 1951年1月16日 |
| 17 | 1951年1月17日 |
| 18 | 1951年1月18日 |
| 19 | 1951年1月19日 |
| 20 | 1951年1月20日 |
| 21 | 1951年1月21日 |
| 22 | 1951年1月22日 |
| 23 | 1951年1月23日 |
| 24 | 1951年1月24日 |
| 25 | 1951年1月25日 |
| 26 | 1951年1月26日 |
| 27 | 1951年1月27日 |
| 28 | 1951年1月28日 |
| 29 | 1951年1月29日 |
| 30 | 1951年1月30日 |
| 31 | 1951年1月31日 |

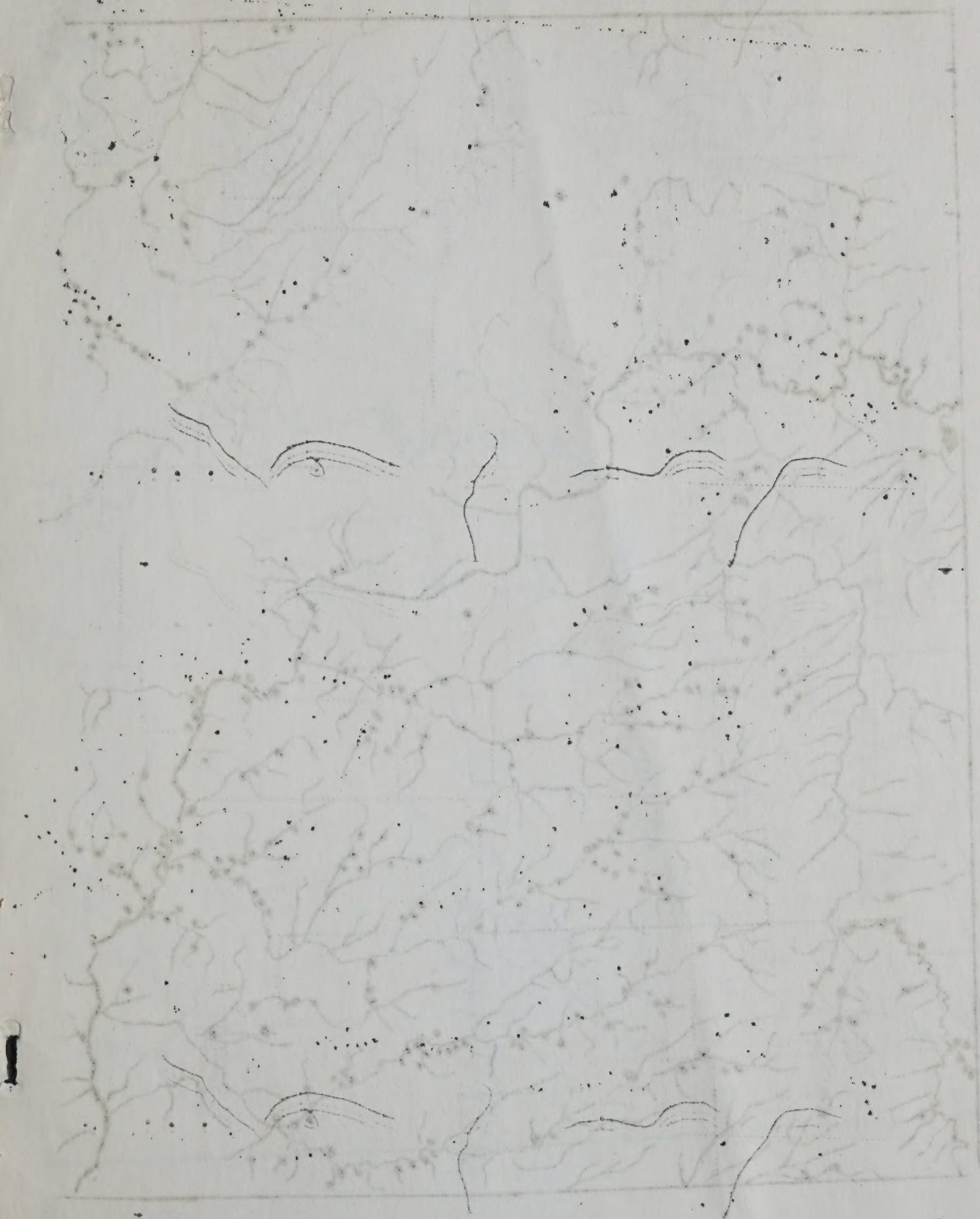
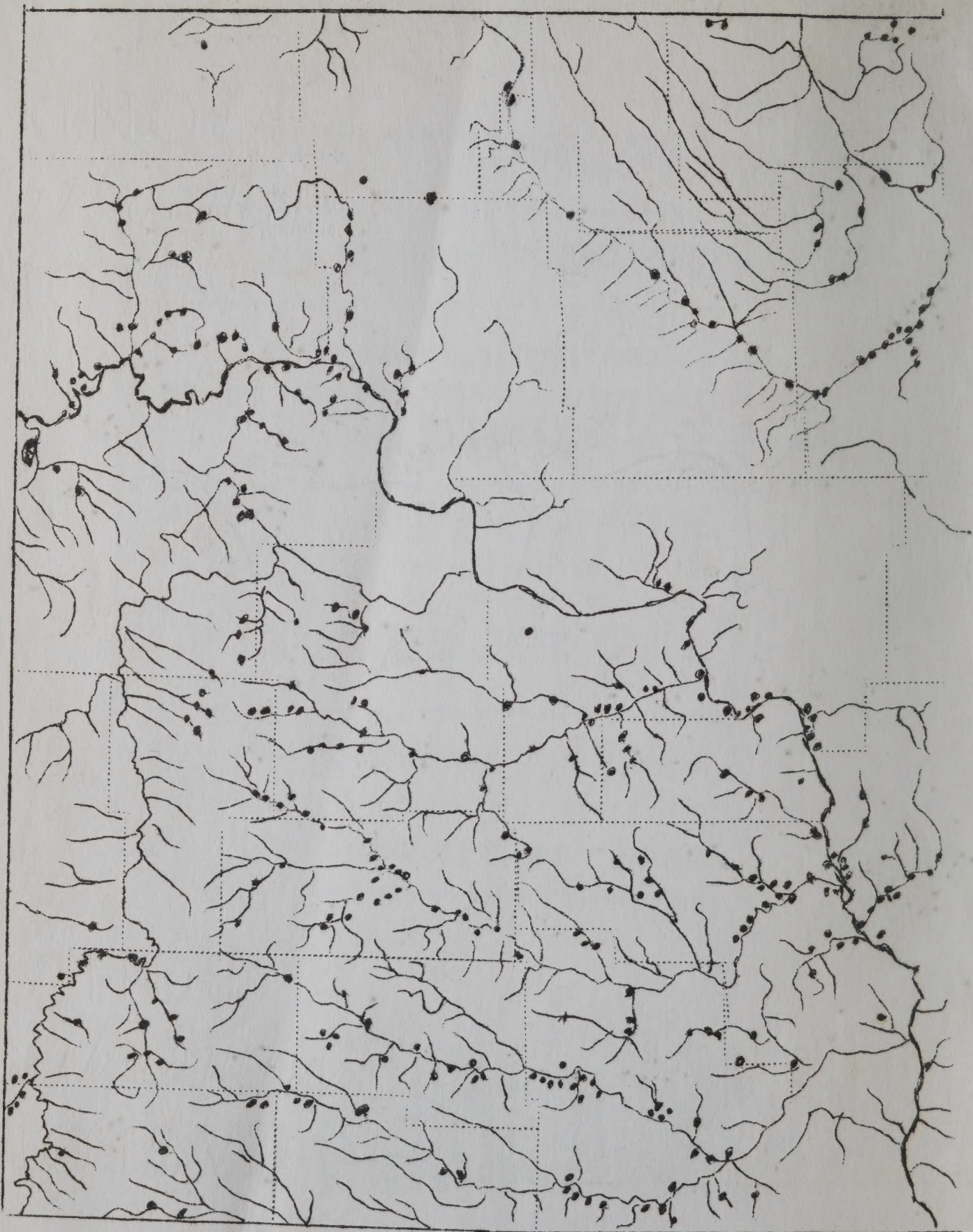
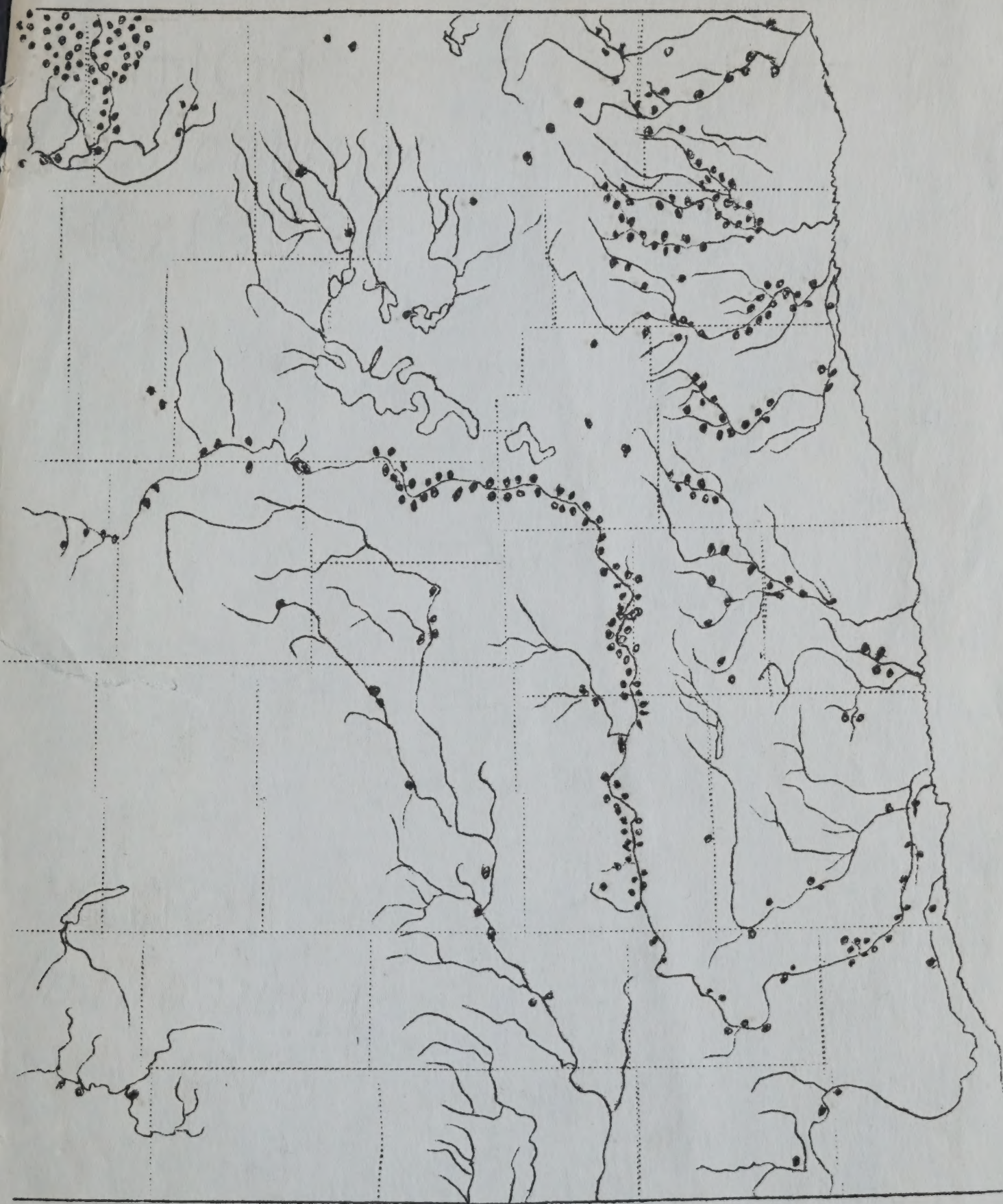


Figure A. Location of 1951-1952 Beaver Permits.







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